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REVIEW OF APPLIED MYCOLOGY

VOL. XXXIV FEBRUARY 1955

YADAV (A. S.). **A contribution to the knowledge of Uredineae of Bihar.**—*Indian Phytopath.*, 6 (*1953*), 2, pp. 86–91, 3 figs., 1954.

This annotated list of 17 Uredineae from Bihar, India [cf. *R.A.M.*, 33, p. 449], comprising new records for the district and new host records, includes *Cerotelium fici* on fig leaves [29, p. 418] at Patna and *Dasturella divina* on bamboo leaves [22, p. 454] in the Parasnath Hills.

MASSENOT (M.). **Quelques récoltes d'Ustilaginales.** [Some collections of Ustilaginales.]—*Bull. Soc. mycol. Fr.*, 49 (*1953*), 4, pp. 403–416, 6 figs., 1954.

This annotated list of Ustilaginales collected in various parts of France and in northern Africa includes *Sorosporium saponariae* [*R.A.M.*, 26, p. 216; 28, p. 360] on [wild] *Dianthus caryophyllus* at Navacelles, Gard, France.

SAVILE (D. B. O.). **Taxonomy, phylogeny, host relationship, and phytogeography of the microcyclic rusts of Saxifragaceae.**—*Canad. J. Bot.*, 32, 3, pp. 400–425, 1 diag., 1954.

The microcyclic species of *Puccinia* on Saxifragaceae are revised in the light of numerous collections made recently in northern Canada, Alaska, and British Columbia. The section on taxonomy includes a key and descriptions of three new varieties and six new combinations. Phylogeny, host relationships, and phytogeography are also discussed.

ROGERS (D. P.). **The genus Cordyceps and Fries's Observationes.**—*Mycologia*, 46, 2, pp. 248–253, 1954.

In the original edition of 'Observationes Mycologicae' by Fries in 1818 the generic name *Cordylia* Fr. (non Pers., 1807) was used; in a re-issue of this work the name *Cordyceps* Fr. was substituted, and in 1823 the latter name was reduced to a 'tribus' of *Sphaeria*. *Cordyceps* Link, 1833, is now considered to be the correct name for the genus, with the type species *C. militaris*.

SCHNEIDER (ROSWITHA). **Plicaria fulva n.sp., ein bisher nicht bekannter Gewächshausbewohner.** [*Plicaria fulva* n.sp., a hitherto unknown greenhouse inhabitant.]—*Zbl. Bakt.*, Abt. 2, 108, 4–7, pp. 147–153, 6 figs., 1954.

A full technical diagnosis is given of *Plicaria fulva* n.sp., which was first observed forming a mat of yellow to cinnamon-brown conidiophores on pots, culture dishes, propagating boxes, and the like on steamed soil in the greenhouses of the Biological Institute, Berlin-Dahlem, in the winter of 1952–3, and has since occurred there regularly in the imperfect state. On the other hand, apothecia have only developed once, on some cyclamen propagating boxes with an overgrowth of mosses and algae.

De Jong (P.). **Part II—Research and Advisory.**—*Rep. Tea sci. Dep. un. Pl. Ass. S. India, 1952–1953*, pp. 4–11, 2 pl., [1953].

In this report [cf. *R.A.M.*, 33, p. 262] it is stated that two tea fields in southern India in the second year of pruning were sprayed weekly from June to October, 1952, from a prototype micron sprayer [31, p. 517] for control of blister blight [*Exobasidium vexans*: 33, pp. 639, 762]. The average swathe width was approximately 80 ft., the total area covered in both fields being about 30 acres, and the time taken 50 minutes using 45 gals. spray. On this basis the sprayer mounted on a lorry moving at 4 m.p.h. would cover 1 acre in 1½ minutes using 1½ gals. spray (6 oz. copper sandoz in an oil-water emulsion). Protection was adequate up to a distance of 60 ft. from the machine.

An extension of the experiment to tea recovering from pruning [33, p. 263] was carried out on Daverashola Estate. Each month from June to October, 1952, a fresh area of about ¾ acre was pruned during the first week; one-third was then sprayed with a 50 per cent. wettable copper fungicide (4 oz. in 10 gals. water) at 16 gals. per acre, one dusted with 6 per cent. cuprosana up to tipping and with 4 per cent. thereafter (both at 5 to 8 lb. per acre), and the third left untreated. Applications began approximately 14 days after the conclusion of pruning and continued every 4 or 5 days up to tipping and at 8- to 10-day intervals thereafter throughout the blister blight season until the first week in January, 1953.

The average percentage intensity of infection on untreated bushes pruned in June was 20, compared with 6·5 on the sprayed and 6·9 on the dusted; July-pruned 13·8, 4·6, and 8·9; August 20·1, 4·7, and 4·4; September 6·6, 1·9, and 1·8; and October 1·4, 0·9, and 1·1, indicating the slight advantage of spraying over dusting. Yields in the three groups were 521, 1,079, and 1,070 lb. green leaf, respectively. Initial benefits derived from crop protection during the early stages of recovery from pruning appear to be maintained to a marked degree throughout the period. June pruning is preferable, for in spite of protection plots pruned in July had more infection in November than those pruned earlier. September and October pruning gave a good chance of escaping severe blight attacks even without treatment.

A blister blight demonstration plot of tea six months from pruning was set out on Arnakal estate, central Travancore, also in three parts, one being dusted with 4 per cent. cuprosana at 10 lb. per acre, another sprayed with 4 oz. perenox in 10 gals. water at 15 gals. per acre, and the third left untreated. The treatments were made at 7-day intervals. The differences between the treated and untreated plots were described as spectacular.

K. S. Venkataramani reports (pp. 27–32) that a blister-forming fungus attacking *Gordonia obtusa* and very similar to *E. vexans* was *E. nilagiricum*. It does not affect tea. Branch canker caused by *Macrophoma theicola* [27, p. 260] was reported from many estates. It is particularly damaging to young plants in new clearings.

Further studies on red 'rust' (*Cephaleuros parasitica*) [*C. mycoidea*: 33, p. 639] in central Travancore and Mundakayam revealed that incidence was correlated with debilitated bushes, inadequate shade, poor drainage and soil ventilation, and drought or insufficient moisture. The increased incidence in recent years is probably due to the severe and continuous droughts. A minimum application of 3·5 lb. potash per 100 lb. made tea is recommended. Plots receiving 40 lb. potash per acre annually had only 1·3 per cent. infection as against 64·8 per cent. in untreated plots. Spraying of young growth is effective only after pruning. For mature tea it is tentatively suggested that the bushes be sprayed once immediately after pruning and again in April to May at the time of maximum spore production, taking care to wet all the newly formed wood. New clearings and young tea should also receive a spray at the same time and another in early May. *C. mycoidea* was also observed [33, p. 104] on *Albizzia moluccana*, *Bixa orellana*, *Calliandra brevipes*, *Erythrina lithosperma*, *Grevillea robusta*, *Rhododendron indicum*, and *Tephrosia candida*.

Root diseases caused by *Poria hypolateritia*, *Ustulina deusta* [*U. zonata*], *Fomes noxius*, and *Rosellinia arcuata* were again reported. The first three, the most common, are initiated by a living tea root coming into contact with a piece of dead infected wood in the soil. Control lies primarily in eliminating the source of infection. In the case of *R. arcuata* the mulch round the dead bush and to a distance of four or five bushes must be removed.

Field-scale studies at Davarshola on the effect of certain seed dressings on the germination of tea seed demonstrated that fernasan and tillex (4 oz. per cwt. seed) [33, p. 639] gave more rapid germination than no treatment or agrosan GN. The germination percentages in the first four weeks were 47, 62, 35, and 37, respectively. Later development, however, was unaffected by any treatment.

Root rot (*Rosellinia bunodes*) [12, p. 435] and brown eye spot (*Cercospora coffeicola*) [C.M.I. map No. 59] occurred on young coffee plants in the Nilgiri-Wynaad.

WEBSTER (B. N.). **Notes on pathological matters.**—*Tea Quart.*, 25, 1, pp. 17–19, 1 pl., 1954.

The author lists the items of information required from planters when diseased specimens are submitted to the Tea Research Institute, and indicates some precautions to be observed in packing plant specimens for transit.

The 'corroded flush' symptom on tea in plucking, hitherto attributed to *Calonectria theae* [*R.A.M.*, 32, p. 455], has been found to be caused by the capsid bug *Lygus viridanus*. Control measures are indicated.

Infectivity trials demonstrated *Amphichaeta grevilleae* to be a vigorous parasite of *Grevillea* seedlings [33, p. 263] and to enter undamaged as well as abraded leaves under conditions of high humidity. Dithane was the most effective fungicide but fortnightly sprays with a 50 per cent. copper fungicide [loc. cit.] at 0·5 per cent. are also recommended for nurseries during the monsoon, together with the erection of 'cadjan' covers 3 to 4 ft. high over the seedlings. Any damage to plants should be avoided.

PORTSMOUTH (G. B.). **The control of blister blight disease of Tea.**—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 1218–1223, 1953. [French summary.]

This is a brief account of the history, incidence, symptoms, and control of blister blight of tea (*Exobasidium vexans*) in Ceylon [*R.A.M.*, 33, pp. 53, 762, and next abstract].

LOOS (C. A.). **Studies in blister blight control XIV. Further studies on the evaluation of some copper fungicidal dusts in the control of blister blight.**—*Tea Quart.*, 25, 1, pp. 10–12, 1954.

In continuation of this series [cf. *R.A.M.*, 33, p. 186 and next abstract] a seven-acre block of tea on the Cairness Division of the Mattakelle Estate, Talawakelle, Ceylon, was dusted with the following 4 per cent. copper dusts, blidust (Pest Control Ltd.), perecloud (Plant Protection Ltd.), Strawson's copper dust (Strawson Chemical Co.), C.C.C. dust, and cuprosana, all at 5 lb. per acre, with an Orient rotary hand duster at intervals of five and ten days from 10th June to 30th September, 1953, for the control of blister blight [*Exobasidium vexans*: loc. cit. and preceding abstract]. There was ample opportunity for build-up of infection outside the plots. Perenox (4 oz. to 100 gals. water) was applied for comparison. On 15th September the degree of leaf infection and die-back of the plucking shoots was rated on a scale from 0 (no infection) to 6 (total loss of plucking shoots), and these two figures were then averaged and matched against an arbitrary scale of descriptive terms.

All the materials gave adequate protection when applied every five days (rating

1·5 to 3). At the ten-day interval blidust and perecloud were the most efficient dusts (3), but perenox gave almost total control (0·5) at a rate of 15 gals.

Loos (C. A.). **Studies in blister blight control XV. 'Blidust' trials under north-east monsoonal conditions in Uva.**—*Tea Quart.*, 25, 1, pp. 13–14, 1954.

Further studies in this series [see preceding abstract] were concerned with trials with 4 per cent. blidust on two fields in the Uva district during the north-east monsoon from 10th October, 1953, to 16th February, 1954. Each field was divided into three plots: A, dusted every eight days with an Orient rotary hand duster using blidust at 5 lb. per acre; B, sprayed with blitox [*R.A.M.*, 32, p. 105] (4 oz. in 10 gals. water) every eight days at 15 gals. per acre; and C, unprotected. Blight [*Exobasidium vexans*] incidence was assessed on 16th February.

In both fields bushes in the sprayed areas carried only a few leaf blisters and no die-back of the plucking shoots. The unprotected plots suffered far more damage than the dusted ones on which protection was classified as 'good'. Blidust is recommended at a rate of 5 lb. every eight days as a short term policy in areas subject to the north-east monsoon, the intervals being shortened in weather particularly favourable to blight development, but not to within three days of plucking in order to avoid undesirable residues.

Ogilvie (L.). **Recent developments in vegetable diseases in Great Britain.**—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 559–563, 1953. [French summary.]

This paper summarizes briefly the more important developments in vegetable (excluding potato) diseases in Great Britain during the war and subsequent years [cf. *R.A.M.*, 26, p. 371].

Bremer (H.). **Drei in Deutschland vorkommende, aber wenig bekannte Gemüse-Krankheiten.** [Three vegetable diseases present, but little known in Germany.] —Reprinted from *Gesunde Pflanzen*, *1954*, 5, 4 pp., 2 figs., 1954.

Little attention has hitherto been paid in Germany to cabbage 'speck', a manifestation of cauliflower mosaic virus [*R.A.M.*, 32, p. 528], responsible for heavy damage in the Lower Rhine Valley in 1952, to chocolate spot of broad bean (*Botrytis fabae*) [C.M.I. map No. 162], observed in the Lower Rhine Valley and Ostfriesland, or to brown root rot of glasshouse tomatoes [*R.A.M.*, 32, p. 516; 33, p. 655], attributed in Holland (*Jversl. Inst. plziektk. Onderz.*, 1952, and an oral communication from F. Tjallingii, of Venlo) to tobacco necrosis virus, the presence of which in Germany has not yet been demonstrated.

Broadbent (L.). **The different distribution of two Brassica viruses in the plant and its influence on spread in the field.**—*Ann. appl. Biol.*, 41, 1, pp. 174–182, 1954.

Most of the information in this account of investigations at Rothamsted Experimental Station on cauliflower mosaic and cabbage black ring spot viruses in field crops of cauliflower in England has already been reported from another source [*R.A.M.*, 33, p. 586].

Both viruses spread equally readily from recently infected plants [cf. 33, p. 398], and more rapidly than from those less recently infected. After two seasons with few aphids (1950 and 1951) the principal sources of virus in spring, viz., overwintering *Brassica* crops, were found to contain only small amounts of cabbage black ring spot virus. It is possible that most of this virus in 1952 came from perennial garden plants. On one farm where cauliflower mosaic virus was widespread cabbage black ring spot was prevalent only near the farmhouse garden. As the flowers of infected stocks (*Matthiola incana*) and wallflowers contain ring spot, it is evident that it is not confined to the older parts of all mature plants.

TAKESHITA (R. M.) & LINN (M. B.). **Possible means of overwintering of the Horse-radish white-rust fungus, Albugo candida.**—Abs. in *Phytopathology*, 43, 9, p. 485, 1953.

Since the conidia of *Albugo candida* [*Cystopus candidus*] cannot survive Illinois winters, other potential means of overwintering were investigated. Oospores were first detected in leaves of greenhouse-grown horse-radish plants in 1951. They were observed in field plants in September, 1952, in limited quantities, mostly in the hypertrophied petioles. Germination experiments gave negative results. Although systemic crown infections are fairly prevalent, the mycelium seldom spreads into the secondary roots (setts) which are used for the next year's planting. Diseased roots are often recognizable by their dark colour, hardness, and hypertrophy of the tissues; they tend to succumb to various secondary decay-inducing organisms. Out of 1,200 commercial setts examined in 1953, only 18 were infected by *C. candidus*.

KAJIURA (M.). **New varieties of fruits, vegetables, and flowers introduced in Japan in recent years.**—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 712–717, 1953. [French summary.]

A new variety of Japanese radish, Takakura Daikon, resistant to radish mosaic virus [*R.A.M.*, 31, p. 97], was produced in Japan in 1946. It will be of great value since in that year 50 per cent. of the Nerima variety, the susceptible parent from which it was bred, was lost in the Tokyo area through mosaic disease, whereas 105,000 kg. per ha. of the new variety were harvested.

KOVÁCS (A.). **Data on the biology of Beet mosaic.**—*Jb. ung. Forschungsinst. PflSch.*, 6 (*1951*), pp. 213–223, 1953. [Hungarian, with Russian and English summaries. Abs. in *Z. PflKrankh.*, 61, 9, p. 453, 1954.]

From the results of investigations in Hungary during 1950, beet mosaic virus appears to have reduced the sugar content of beets by 0·93 per cent., besides appreciably diminishing their size. An early symptom is a pale, ring-pattern mosaic and in the autumn brown rings like those of *Cercospora* [*beticola*] develop, but they disappear in warm weather. Infection seldom or never occurs through the cotyledons, developing most rapidly and abundantly in the second- to third-leaf stage. *Beta trigyna* is immune.

WENZL (H.). **Untersuchungen über Verdickungen und Brüchigkeit des Rübenblattes als Primärsymptom der Vergilbungskrankheit (Beta Virus 4).** [Investigations on thickening and brittleness of the Beet leaf as a primary symptom of yellows disease (*Beta* virus 4).]—*PflSchBer.*, 13, 7–8, pp. 106–111, 1954. [English summary.]

Investigations carried out in Austria during 1952 and 1953 [*R.A.M.*, 34, p. 12] confirmed Sedlag's report from Germany (*Merkbl. PflSchAmt Halle* 72, 1952) that thickening and brittleness precede chlorosis in beet leaves infected by beet yellows virus. It appears, however, that thickening by itself is not sufficiently reliable for diagnosis of the virus, which can be based only on the development of interveinal yellowing together with thickening.

PLOTHO (O. v.). **Die Pilzflora der Rübenknäule.** [The fungus flora of the Beet cluster.]—*Zucker*, 6, 12, pp. 291–297, 9 figs., 1953.

A semi-synthetic agar medium containing 3 per cent. syrup proved to be particularly well suited to the isolation of fungi from sugar beet fruit clusters at the Institute for Microbiology of the University of Göttingen, Germany. The following species were identified: *Mucor mucedo*, *Rhizopus nigricans* [*R. stolonifer*], *Pythium debaryanum*, *Aspergillus glaucus*, *A. niger*, a *Penicillium* of the subsection *glaucum*, *Phoma betae*, *Ramularia betae*, *Cercospora beticola* [*R.A.M.*, 33, p. 516 and next

abstracts], *Alternaria tenuis* [loc. cit.], *Macrosporium cladosporioides* [19, p. 319], and *Fusarium* sp. Attention is drawn to the inadequacy of existing methods of seed treatment [33, p. 517] and to the urgent need for a new approach to the problem.

Fransen (N. O.). **Konidienbildung bei Cercospora beticola in künstlichen Kulturen.** [Conidial formation by *Cercospora beticola* in artificial cultures.]—*Zucker*, 6, 18, pp. 441–443, 2 figs., 1953.

At the Baden branch of the Max Planck Institute for Breeding Research, Ladenburg/Neckar, Germany, *Cercospora beticola* [see preceding and next abstracts] produced conidia in flask cultures on sterilized beet, white cabbage, and leek leaves with a substratum of soil (compost or sand). They were formed as freely in total darkness as in the light. Production was also abundant on 10- to 14-day-old beet leaf agar cultures cut into dice, allowed to dry for a short time, and then exposed to high atmospheric humidity, as originally recommended by Rands (*Phytopathology*, 7, pp. 316–317, 1917) for conidial development in *Alternaria solani*.

Malmus (N.). **Die Bedeutung einiger wichtiger Krankheiten und Schädlinge für Ertrag und Wirtschaftlichkeit des Bayerischen Zuckerrübenbaues.** [The importance of some serious diseases and pests on the yield and economy of the Bavarian Sugar Beet culture.]—*Pflanzenschutz*, 6, 3, pp. 34–36, 1954.

Throughout Bavaria the most important disease of the sugar beet crop is yellows virus [*R.A.M.*, 33, p. 206], the total loss from which in the heavily infected Franconian-Swabian area in 1952 was computed at DM. 4,914,250 [cf. next abstract]. In other parts of the State the reduction did not exceed DM. 1,000,000, which is also a rough estimate of the damage caused by the milder outbreak of 1953. The foliage of plants attacked by yellows virus is particularly susceptible to leaf spots (*Alternaria tenuis* [31, p. 585] and *Cercospora beticola* [33, p. 516 and preceding abstracts]). In 1951 the latter was present over the entire beet-growing area of 20,542 ha., causing a loss to the State calculated at DM. 26,000,000; in both 1952 and 1953 it would be approximately DM. 13,000,000 to 14,000,000. Spraying against *C. beticola* [loc. cit.], which costs about DM. 90 per ha., must therefore be supplemented in 1954 by aphicidal treatments at an estimated cost of DM. 100 per ha. for the prevention of yellows virus.

Heiling (A.). **Der Einfluss der Vergilbungskrankheit auf den Ertrag der Rüben.** [The influence of the yellows disease on Beet yield.]—*Zucker*, 6, 2, pp. 27–33, 1 diag., 4 graphs, 1953.

When an extremely severe outbreak of beet yellows virus occurs in western Germany [*R.A.M.*, 34, p. 12 and preceding abstract], the maximum root and sugar yields to be expected are 50 to 60 and 60 to 70 per cent. of the normal, respectively, whereas the fall in leaf production may be comparatively slight [33, p. 194]. Diseased leaves, however, wilt and decay more rapidly than healthy ones, besides containing 30 to 50 per cent. less protein [33, p. 573]. The damage may be minimized by timely soil amendments with nitrogen, while potassium chloride appears to be more effective than potassium sulphate. Fodder beets are particularly susceptible to the yellows virus.

Swenson (K. G.), Davis (A. C.), & Schroeder (W. T.). **Reduction of Pea virus spread by insecticide applications.**—*J. econ. Ent.*, 47, 3, pp. 490–493, 1954.

In 1952 the incidence of pea enation mosaic and other [unspecified] viruses on the Dwarf Telephone variety in small plots at the New York (Geneva) Agricultural Experiment Station was reduced from 53 to 24 per cent. by three applications of an emulsifiable concentrate of parathion (containing 25 per cent. of the active in-

gredient) used at the rate of 0·25 lb. for the control of the aphid vector, *Macrosiphum pisi* [*Acyrthosiphon pisum*]. A similar formulation of clemeton (containing 42 per cent. *O,O*-diethyl-*O*-2(ethyl mercapto)-ethyl thionphosphate) at 0·5 lb. per acre reduced the amount of infection to 20 per cent., but since its use on food crops was not expedient, further large-scale trials on Bonneville peas in 1953 were made with parathion only. In three plantings virus incidence was reduced from 13·5 to 3·2, 29 to 8·4, and 21·9 to 10·4 per cent., respectively.

A study of yield records to evaluate the economic significance of the experimental data showed that in some cases the gain derived from a reduction of as little as 11·5 per cent. more than sufficed to pay for the cost of parathion treatment, while a drop of 20 per cent. resulted in a definite profit.

HOFER (A. W.). **Description of a virus that destroys the root nodule bacteria of Peas.** —*Soil Sci.*, 77, 6, pp. 435–436, 1954.

From the New York (Geneva) Agricultural Experiment Station the author contributes a diagnosis of *Phagus rhizobii*, the well-known but hitherto unnamed, undescribed virus that destroys the root nodules of peas (*Rhizobium leguminosarum*) and other legumes [cf. *R.A.M.*, 14, p. 743]. Its dimensions range from submicroscopic to 0·5 μ, usually 0·25 μ, and its shape resembles half a dumbbell. The optimum pH for lysis lies between 6 and 7·8. The virus is acid-fast but responds to staining with auramin and to ultra-violet irradiation by a yellow glow.

Wilt-resistant Green Pea.—*N.Z. Gdnr*, 11, 1, p. 13, 1954.

It is reported that Kelvedon Monarch, a new pea variety, highly resistant to *Fusarium* wilt [*F. orthoceras* var. *pisi*: *R.A.M.*, 32, p. 114; 33, p. 140], will shortly be available on the New Zealand market.

BREMER (H.). **Schokoladen- oder Braunflecken der Ackerbohnen (Botrytis fabae Sard.). Ein Sammelbericht.** [Chocolate or brown spots of Broad Beans (*Botrytis fabae* Sard.). A compilation.]—*Z. PflKrankh.*, 61, 8, pp. 402–405, 1 fig., 1954.

Chocolate spot of broad bean (*Botrytis fabae*) has not yet been reported from Germany [C.M.I. map No. 162], but in his survey of 23 contributions to the literature on the subject (most of them already noticed in this *Review*) the author states that the disease is undoubtedly present in that country, at any rate in the north-western provinces of Ostfriesland and Lower Rhine.

CARDONA ALVAREZ (C.). **Pudriciones fungosas radiculares del Frijol (Phaseolus vulgaris L.) en el Valle de Medellín-Colombia.** [Fungal root rots of the Bean (*Phaseolus vulgaris* L.) in the Valley of Medellín-Colombia.]—*Rev. Fac. Agron. Medellín*, 15, 46, pp. 137–209, 9 figs., 1954.

In 1948 and 1949 the author investigated the root rots of bean in Medellín and some other regions of Colombia. The percentages of natural infection ranged from 68·6 to 100, with resultant crop reductions of up to 93 per cent. The pathogens fell into three groups, (*a*) highly virulent, comprising *Marasmius* (?) *sacchari* [cf. *R.A.M.*, 33, p. 51], *Rhizoctonia* [*Corticium*] *solani*, *Sclerotium rolfsii*, and *R.* sp.; (*b*) of low virulence, *Fusarium solani* f. *phaseoli*, *F. oxysporum* f. *phaseoli*, and *Macrophomina phaseoli*; and (*c*) intermediate, *Pythium debaryanum*. The heaviest damage to seed was caused by *C. solani* and *S. rolfsii*, followed by *P. debaryanum*. At this stage Uribe redondo [round] was the most resistant of the eight commercial varieties tested, Uribe rojo [red], Sangretoro, Estrada rosado, Panameño, and Algarrobo the most susceptible, and Higuerillo and Uribe catarina intermediate in reaction.

JOUBERT (T. G. LA G.). **Hard-skin in Beans.**—*Fmg in S. Afr.*, 29, 337, pp. 225, 232, 1 graph, 1954.

Hard skin of Green Savage bean [*Phaseolus vulgaris*] seeds, observed recently at the Horticultural Research Station, Pretoria, is the cause of poor germination and seedling growth, and was found to be induced by conditions of low relative humidity during plant growth and seed storage. In particular, storage in artificially heated buildings should be avoided.

FERGUS (I. F.). **Manganese toxicity in an acid soil.**—*Qd J. agric. Sci.*, 11, 1, pp. 15–27, 1 fig., 1 diag., 2 graphs, 1954.

A description is given of the symptoms and occurrence of manganese toxicity (over 1,000 p.p.m.) in French beans (*Phaseolus vulgaris*) [*R.A.M.*, 22, p. 339; 33, p. 629] growing on Dagun soil on the edge of the Mary River Valley, Queensland. Stunting and severe marginal and interveinal leaf chlorosis are characteristic on plants from the very acid parts of the area, and in extreme cases crinkling and necrotic spotting develop. Flowering is reduced and no fruit is set. In less severe cases recovery is possible, though the yield of pods is poor. In pot experiments excessive uptake of manganese by French beans was controlled by lime in sufficient quantity to raise the pH to about 5·4. Experiments further showed that the soil can be regarded as suspect if the pH is low and the easily reducible manganese high. French bean was found to be a good indicator of excessive manganese in the soil.

BANGE (O.). **New varieties of fruit and vegetables introduced in Holland in recent years.**—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 624–631, 1953. [French summary.]

In this annotated list of new varieties of fruits and vegetables developed in the Netherlands since 1946, three new varieties of dwarf French beans [*Phaseolus vulgaris*] are reported to be resistant to *Phaseolus* virus 1 [bean mosaic virus: *R.A.M.*, 32, p. 229]: G 32 Furore, G 71 Servus, and G 76 Voorluk. Pole varieties also resistant to this virus are G 31 Mentor, G 37 Infra, G 57 Animo, and G 75 Supra.

BASSE (H.). **Deutsche Gemüse- und Obstzüchtungen der neueren Zeit.** [German vegetable and fruit breeding in recent times.]—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 631–642, 4 pl., 1953. [English and French summaries.]

Three new varieties of French bean [*Phaseolus vulgaris*] have recently been introduced in Germany, resistant to anthracnose [*Colletotrichum lindemuthianum*: *R.A.M.*, 31, p. 584]. They are the stringless Imuna (1942), Wachs Resista (1951), and Grandimuna (1951), all bred by Schreiber.

What can you do about diseases?—*Soybean Dig.*, 14, 8, pp. 8–9, 19, 1 fig., 1954.

This is a summary, compiled by research workers, of the available information on the control of soy-bean diseases in the United States [*R.A.M.*, 27, p. 212; 32, p. 165] (where the annual losses from this source during the period from 1942 to 1951 amounted to some 12½ per cent. of the crop). In a note on p. 19, the soy-bean disease situation in the mid-western States of Illinois, Indiana, and Iowa is briefly described from a paper presented by D. W. Chamberlain at the recent Tri-State Soybean Conference at Columbus, Ohio.

JONES (H. A.). **Hybrid Onions and the production of hybrid seed.**—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 396–402, 2 pl., 1953. [French summary.]

Methods are described for the production of hybrid onion seed in the United States. In northern States hybrids between Brigham Yellow Globe and Early Yellow Globe outyield the parents and keep better in storage. In southern areas

early hybrids from the parents Excel, L 690, CC 163, and Texas Early Grano 502 have been developed, which have good combining ability, are resistant to pink root (*Pyrenochaeta terrestris*) [*R.A.M.*, 32, p. 6], and do not split or bolt.

Leyendecker (P. J.). **Fungi associated with internal contamination of sun-dried Chile in New Mexico.**—*Bull. Torrey bot. Cl.*, 81, 5, pp. 400–404, 1 fig., 1 graph, 1954.

The fungi isolated most commonly from internal mould of sun-dried chilli (*Capsicum annuum*) in New Mexico [*R.A.M.*, 33, p. 519] were *Alternaria tenuis*, *A. solani*, *Fusarium 'roseum'*, *F. moniliforme* [*Gibberella fujikuroi*], *Stemphylium botryosum* [*Pleospora herbarum*], and *Hormodendrum* [*Cladosporium*] *cladosporioides*, all of which enter through frost-damaged areas; 16 other species were also involved. When atmospheric moisture collected in the shoulder folds of fleshy pods, *A. solani* and *A. tenuis* entered by direct penetration of the ovary wall. About 200 progeny lines were examined for resistance to frost damage but without success. Mould percentages were lower, however, in lines which produced pods with narrow shoulders and a tight-fitting calyx.

Geraldson (C. M.). **The control of blackheart of Celery.**—*Proc. Amer. Soc. hort. Sci.*, 63, pp. 353–358, 2 figs., 1954.

Investigations on the black heart disease of celery [*R.A.M.*, 29, p. 88], carried out at the Gulf Coast Experiment Station, Florida, showed that it is due to calcium deficiency in the growing point and may be completely cured by the application of 0·05 to 0·25 M solutions of calcium salts to the affected part. Repeated applications may be necessary to keep the heart supplied with sufficient calcium for healthy growth. Affected tissue contains only about 0·1 per cent. calcium; after treatment healthy hearts contain up to 0·52 per cent.

Kendrick (J. B.), Wedding (R. T.), Middleton (J. T.), & Hall (B. J.). **Some factors affecting development and control of adaxial crack stem of Celery.**—*Phytopathology*, 44, 3, pp. 145–147, 1954.

From the results of field trials on the Utah 10B variety in California it is concluded that adaxial crack stem of celery, due to boron deficiency [see next abstract], may be controlled by avoiding excessive nitrogenous fertilizers (not over 400 lb. per acre) and spraying the plants at the 10- to 12-leaf stage with 8 lb. borax per acre. Magnesium and manganese salts were found to be ineffective.

Knott (J. E.). **The problem of 'brown checking' of Celery.**—*Rep. Int. hort. Congr.*, 13 (*1952*), pp. 403–412, 1953. [French summary.]

These observations on the incidence and control of brown checking (adaxial crack stem) of celery, caused by boron deficiency, in California, have already been noticed [*R.A.M.*, 32, p. 533 and preceding abstract].

Yale (J. W.) & Vaughan (E. K.). **Ringspot-like virosis of Rhubarb.**—*Phytopathology*, 44, 3, pp. 118–122, 3 figs., 1954.

This is an amplified account of studies at Oregon Agricultural Experiment Station on a disease of rhubarb provisionally attributed to a virus of the ring spot group, a preliminary note on which has already appeared [*R.A.M.*, 33, p. 402].

Evans (A. C.). **Groundnut rosette disease in Tanganyika. I. Field studies.**—*Ann. appl. Biol.*, 41, 1, pp. 189–206, 2 diags., 3 graphs, 1954.

In Tanganyika rosette virus disease of groundnuts [*R.A.M.*, 33, p. 575] is brought into the crop by infective alatae of *Aphis craccivora* and spread within the crop by apterae and alatae. During the dry season the aphids maintain themselves

on self-set groundnuts and on *Vigna* and *Millettia* (or *Lonchocarpus*). No native source of the virus has been found.

In a preliminary trial in which groundnuts were sprayed with a commercial preparation based on schradan, containing 0·5 per cent. active ingredient in 0·1 per cent. wetter at the rate of 40 gals. per acre, to eliminate the aphid vector, two applications made 23 and 41 days after planting gave after 48 days about 20 rosetted plants per plot, as against over 60 in the untreated. In a further test one application of 0·5, 0·3, or 0·1 per cent. schradan gave, 25 days after spraying, 0·31, 0·66, and 0·73 affected plants per plot, respectively, as compared with 0·97 in the untreated. Individual sprayed plants were then infested with about 100 aphids to determine speed of kill. It was found that with the three concentrations, respectively, all the aphids were dead 24 hours, two days, and three days after spraying. A heavier infestation was made on the seventh day after spraying; concentrations of 0·5 and 0·3 per cent. eliminated the aphids by the fourth and fifth day, respectively, after infestation.

Hemingway (J. S.). **Cercospora leafspots of Groundnuts in Tanganyika.**—*E. Afr. agric. J.*, 19, 4, pp. 263–271, 1954.

In the areas farmed by the Overseas Food Corporation in Tanganyika heavy losses in yields of groundnuts are caused by the leaf spots due to *Cercospora personata* [C.M.I. map No. 152] and *C. arachidicola* [*R.A.M.*, 31, p. 47]. A very few lesions of *C. personata* were observed on the first plantings at Kongwa in 1948. In 1949 incidence there was again slight, and also at Nachingwea; both species were present at Urambo late in the growing season. Infection was ascribed to wind-borne spores spreading from neighbouring native plantings invariably infected by both fungi.

In 1950 the disease was again slight at Nachingwea. At Kongwa and Urambo, however, epidemic outbreaks caused extensive leaf fall on most plantings towards harvest-time. In both districts volunteer groundnut plants had persisted through the dry season. Other volunteers germinated after the first rains and on these the disease built up rapidly, subsequently spreading to the later crop: sample transects showed no evidence of spread from the bush.

In 1951–2–3, in all three areas the epidemics became more serious as the extent of cultivation increased. Defoliation frequently set in when the plants were 55 to 60 days old, and in many instances was complete by the 80th to 90th day. The principal variety grown, Natal Common, has a growth period of 100 to 110 days. At Urambo the common pathogen is *C. arachidicola*, whereas at Kongwa and Nachingwea it is *C. personata*.

At Nachingwea and Urambo volunteer populations of 20,000 plants or more per acre are common. These populations gradually decline during the dry season from termite activity and lack of water. Some lesions of both species can always be found, though there is seldom much leaf fall from these volunteers.

The evidence indicates that the *Cercospora* mycelium can persist in a dormant state for at least six months and the undestroyed diseased plant residues serve as a carry-over reservoir. There are also strong indications that viable inoculum can persist in the soil. Thus, if groundnuts are planted for a second year in succession, they become attacked at an early stage, and large numbers of lesions are present ten days after germination, each leaf becoming infected as it opens. Later, all the lower leaves of the affected plants bear numerous lesions, arising, probably from rain splashes. Seed-borne infection is of minor importance.

Control measures recommended are a two-year rotation, the collecting and burning of all combustible residues by the middle of the dry season, and disking or ploughing all remaining residues and volunteers before the germination of the new crop; volunteers on headlands and elsewhere should be destroyed.

The resistant Mwitunde variety is under detailed observation, together with Kangoma and H.G. 1, and selection work is proceeding.

LAMBERT (E. B.) & AYERS (T. T.). **An improved system of Mushroom culture for better control of diseases.**—*M.G.A. Bull., 1952*, 33, pp. 267–276, 6 graphs, 1952.

This information has already been noticed from another source [*R.A.M.*, 32, p. 59].

SARAZIN (A.). **The cultivated Mushroom—5. Germination of spores and development of mycelium. 6. Development.**—*M.G.A. Bull., 1952*, 33, pp. 281–285, 5 figs., 1952; *1953*, 37, pp. 10–13, 4 figs., 1953.

A brief account is given (part 5) of the spore germination and the development of mycelium in the cultivated mushroom [*Psalliota bispora*]. It is stated that the spores germinate better when sown collectively than individually; germination frequency decreases rapidly with age; spore viability varies from three to five years; and that the germination of basidiospores takes place in two stages.

Part 6 deals with the physical and chemical factors influencing the growing zone of the bed. Disturbances of the growth of the carpophore, due to volatile substances [see next abstract], are described.

STOLLER (B. B.). **Studies on the function of the casing for Mushroom beds. Part I: The relation of the abnormal growth of the cultivated Mushroom to fructification and casing soil. Part II: Some chemical and physical characteristics of the casing soil and their effect on fructification. Part III: The use and characteristics of peat as a casing for Mushroom beds.**—*M.G.A. Bull., 1952*, 34, pp. 289–297; 35, pp. 321–326; 36, pp. 352–360, 1 fig., 1952.

In the first article the author deals with the relation of carbon dioxide to mushroom growth [see next abstract and *R.A.M.*, 32, p. 60], volatile products of the mycelium [loc. cit.], and ventilation of the medium by forced air circulation. Non-fibrous peat [32, p. 467] mixed with 6 per cent. limestone and 3 per cent. gypsum is a good casing material.

In Part II it is stated that the better the water-holding capacity of casing soil and peat, when sufficiently aerated, the better the yield. Lowering the temperature to induce fructification results in an increase in the solubility of the atmospheric gases. This increase may induce greater absorption of water, faster release of carbon dioxide, and better oxygenation of the soil solution. At the junction of the soil particle, water, and oxygen, thickenings on the mycelial strands occur, giving rise to sporophores by an oxidation-reduction reaction. It is believed that the cation-exchange capacity, which would induce the rise in pH necessary for fructification, may determine the suitability of a material for casing.

Part III is devoted to preparation and use of non-fibrous peat for casing to obtain the best results and highest yields. It must be almost saturated (80 per cent.) with water and well tamped. It can be used for five years, crops of 2 lb. per sq. ft. having been harvested repeatedly. Additions of potassium fertilizer and dithane D-14 result in increased yields. Mycelial growth in peat casing is very dense and this may account for its sensitivity to insufficient ventilation and its better water absorption.

GARRETT (S. D.). **Function of the mycelial strands in substrate colonization by the cultivated mushroom, Psalliota hortensis.**—*Trans. Brit. mycol. Soc.*, 37, 1, pp. 51–57, 1 pl., 1954.

Experiments at the Botany School, University of Cambridge, demonstrated that a certain inoculum potential is needed for the successful colonization of a suitable prepared compost (synthetic wheat straw from Yaxley, Peterborough) [*R.A.M.*,

29, p. 493 and preceding abstract] in test tubes by mycelial strands of the cultivated mushroom (*Psalliota hortensis*) [*P. bispora*]. The fungus was grown on malt extract agar, which proved to be the best medium [cf. 32, p. 467]. Colonization of the compost at 25° C. was rapid when inocula were taken from 4 and 6 per cent. malt and was apparently complete in all the tubes (4 gm. compost) before the first recording at 17 days. With 0·5 per cent. malt inoculum, however, only one of 12 tubes was colonized after 49 days; with 1 and 2 per cent. malt there was a considerable delay before growth started. The superiority of submarginal over marginal inoculum disks was generally apparent.

Soil columns of different lengths, 1·9 cm. in diameter, moistened to 60 per cent. saturation, were set up over 1 gm. commercial, pure culture, air dry mushroom spawn at 25° C. The inoculum grew through 3 cm. soil in 9 to 12 days, 6 cm. in 14 to 18 days, 12 cm. in 22 to 27 days, and 18 cm. in 34 to 38 days. Removal of the inoculum at the time of contact between the mycelial strands and the compost at the head of the column of soil delayed colonization, the extent of delay increasing with the greater length of the intervening soil column. New mycelial strands soon grew out from freshly colonized compost into new soil but not into soil already occupied by older strands.

It is concluded that success in compost colonization by mushroom mycelium and the time required depend upon the inoculum potential of the growing tips of the mycelial strands, and that this in turn depends on the size and vigour of the inoculum and its distance from the food base.

Wilkinson (R. E.). **Berberis thunbergii, a host of Cucumber mosaic virus (Marmor cucumeris).**—Abs. in *Phytopathology*, 43, 9, p. 489, 1953.

The leaves of *Berberis thunbergii* bushes in New York State frequently show a mosaic pattern of reddish blotches, accompanied by more or less pronounced stunting and distortion. Infection is readily transmitted by mechanical means from succulent tissue to tobacco. Symptoms typical of those observed in nature were reproduced by mechanical inoculation of *B. thunbergii* seedlings with a known strain of cucumber mosaic virus, which was subsequently recovered from the infected bushes.

Pierson (C. F.). **The relation of Cladosporium cucumerinum to resistant and susceptible Cucumber tissues.**—Abs. in *Phytopathology*, 43, 9, pp. 481–482, 1953.

Cladosporium cucumerinum penetrated the tissues of cucumber plants held at 17° C. in a saturated atmosphere, directly from appressoria 48 hours after inoculation [? at the University of Wisconsin]. Progress was intercellular at first in both resistant and susceptible varieties, but the cells of the latter are invaded 96 hours after inoculation with subsequent coagulation of protoplasm and lysis, leading to the formation of underlying cavities, which cause sunken lesions to develop on the fruits, stems, and petioles, and shot hole of the leaves. In resistant varieties [*R.A.M.*, 33, p. 135] the intracellular progress of the fungus is arrested by thickening and necrosis of the cell walls. Sunken lesions are rare and shot hole absent.

Anderson (C. W.). **Two Watermelon mosaic strains from Central Florida.**—*Phytopathology*, 44, 4, pp. 198–202, 1 fig., 1954.

At the Department of Plant Pathology, Florida Agricultural Experiment Station, Gainesville, two strains (the type and the yellow) of watermelon mosaic virus [*R.A.M.*, 32, p. 359] induced systemic symptoms in 12 cucurbitaceous species, including Cannonball watermelon, squash, vegetable marrow, cantaloupe, citron (watermelon), *Melothria pendula*, *Lagenaria siceria*, *Luffa cylindrica*, and *L. aegyptiaca*. The yellow strain was also recovered from naturally infected plants

of *Cucumis anguria*. The type strain is designated *Marmor citrulli* and the yellow *M.c. flavidanum* (yellow watermelon mosaic virus). Both were transmitted by *Myzus persicae*, were inactivated in extracted sap by ten minutes' exposure to a temperature of 60° C. or ten days' ageing, and withstood dilution to approximately 1 in 10,000. The yellow strain differed from the type in generally causing more chlorosis, stunting, and distortion, and was slightly less stable in physical properties. It was, moreover, pathogenic to *Cucurbita okeechobeensis* in winter, caused mild symptoms in *Cyclanthera pedata*, and was destructive to Hale's Best cantaloupe.

Two cucumber varieties, Ohio MR 17 and Niagara [34, p. 10], resistant to the southern [celery mosaic] strain of cucumber mosaic virus [31, p. 542], proved susceptible to watermelon mosaic virus. Of the three viruses with which watermelon mosaic may be compared, namely, cucurbit mosaic [cucumber green-mottle mosaic], muskmelon mosaic [27, p. 271; 31, p. 368], and bottle gourd mosaic [a strain of cucumber green-mottle mosaic: 31, p. 531], the last-named is considered to present the closest analogies.

Weed eradication, cultivation of resistant or tolerant varieties, and use of healthy seed are of actual or potential importance in the local control of cucurbit viruses.

29. Pflanzenschutz-Tagung der Biologischen Bundesanstalt Braunschweig in Heidelberg, 5.–9. Oktober 1953. [Twenty-ninth Plant Protection Conference of the Federal Biological Institute, Brunswick, at Heidelberg, 5th to 9th October, 1953.]—*Mitt. biol. ZentAnst. Berl.* 80, 178 pp., 13 figs., 7 diags., 8 graphs, 5 maps, 1954.

Some of the information in this report [cf. *R.A.M.*, 33, p. 12] has already been noticed from other sources [33, p. 588 *et passim*]. General subjects were discussed in contributions by H. Thiem (pp. 17–22) on biological research and plant protection; W. Kotte (pp. 23–28) on urgent plant protection problems in German fruit culture, including nutritional disorders, virus diseases, the warning service, and spraying apparatus; L. Niemeyer (pp. 28–33) on similar problems in viticulture, among which may be mentioned the control of roten brenner (*Pseudopeziza tracheiphila*), the phytotoxicity of some of the copper sprays used against this disease and *Peronospora* [*Plasmopara viticola*], and court-noué; and B. Rademacher (pp. 34–50) on the regional plant pathology of south-west Germany.

The application of aphicidal treatments to the control of potato viroses and beet yellows virus is referred to by G. Unterstenhöfer (pp. 51–64), in connexion with the problem and prospects of internal plant therapy, and by K. Heinze (pp. 81–86) in relation to the influence of systemic plant protectives on the transmission of viroses by aphids; the former author also deals briefly with the use of antibiotics against fungal diseases.

M. Klinkowski (pp. 95–98) reports on the results of preliminary tests by Hedwig Köhler at the Aschersleben Phytopathological Institute on the control of apple mildew (*Podosphaera leucotricha*) by spraying with undiluted culture filtrates of soil organisms, comprising two strains of *Streptomyces griseus*, six unidentified *S.* isolates, and *Penicillium* 119/9a [cf. 33, p. 13]. Absolute protection was conferred by three applications to the branches, at the bud and pre- and post-blossom stages, of one strain of *S. griseus* (the other being almost equally effective), *S.* 189/3c, and *P.* 119/9a.

The results of studies by Gabriele Baumeister (pp. 98–102) at the Pomology Research Institute, Jork, near Hamburg, on the biology of apple scab (*Venturia inaequalis*) in the spring of 1952 and 1953 demonstrated the importance of light as a factor in ascospore discharge. By means of a specially constructed trap [34, p. 39], running continuously for seven hours from 4 a.m., the flights of spores were found to begin slowly after 8 o'clock, reaching a maximum between 10 and 10.30

a.m. On days of persistent rain the main flights invariably commenced in the midday hours and ceased almost entirely after the onset of darkness.

The problem of periodicity in apple scab epiphytotics was approached in the light of attacks on Horneburger Pfannkuchen fruits during the period from 1942 to 1952. Severe and mild scab years alternated, with the exception of the dry season of 1947, which was extremely unfavourable to the pathogen. The following explanation for the alternations is adduced. In epiphytotic years the heavily infected leaves become densely filled with innumerable minute perithecia, which are too crowded to mature, hence the lightness of the spore flights in the following spring and the relative mildness of the disease. Conversely the few perithecia formed in the succeeding autumn are all able to reach maturity during the winter.

The effect of autumn spraying [33, p. 608] against late scab on perithecial development was also investigated. After an initial delay perithecial growth in sprayed leaves was resumed and during the second half of January it equalled and finally exceeded that occurring in the untreated. Whether the spraying kills a proportion of the perithecia, thereby leaving more nutriment for the remainder, or other competitors are eliminated with the same result, it was generally observed that the fewer the perithecia in a leaf, the more rapid was their development.

The conditions governing the toxicity of sulphur to vine mildew (*Oidium tuckeri*) [*Uncinula necator*: 17, p. 652 *et passim*] were investigated by A. F. Wilhelm (pp. 116–119) at the State Viticultural Institute, Freiburg-im-Breisgau. Its fungicidal action was shown to be due to the sulphur itself and not to any compounds formed from it. Conidial germination in 48 hours was totally inhibited by 2 per cent. ultrasulphur, 1·3 per cent. cosan wettable sulphur, and 1 per cent. sulphur 3 (with particles measuring 0·004 to 0·01 mm. in diameter) at dilutions of 1 in 10,000; the ultra-filtrates of the two first-named were equally effective at 1 in 1,000 and 1 in 100, respectively. The influence of particle size on the efficiency of the products was further shown with 1 per cent. sulphurs 1 (0·1 mm.) and 2 (0·015 to 0·02 mm.), which permitted 4 and 8 per cent. germination, respectively. Light was shown to be unnecessary for the destruction of the conidia, which was, however, closely dependent on temperature. Below 15° C., for instance, two- to four-day exposures to the fungicides were without effect; at 16° damage was already noticeable, and at 20° it was severe after one day, whilst at 30° and 35° viability was lost in 18 and six hours, respectively.

The chemical processes involved in the action of sulphur on *U. necator* are discussed by H. Haeussler (pp. 119–120), who found in experiments at Seelze [Hanover] that infected vine leaves dusted with sulphur evolve measurable quantities of hydrogen sulphide, e.g., 15γ between the ninth and 24th hours. Under comparable conditions the compound was not formed either by healthy leaves similarly treated or by sulphur itself, indicating that hydrogen sulphide production is a function of the fungus.

A. Herschler (pp. 125–128) describes some economically important growth disorders affecting Riesling vines at the Viticultural Institute, Bernkastel-Kues, Moselle Valley. Boron deficiency [33, p. 589] of recent years has caused heavy losses, sometimes amounting to complete sterility. Soil exhaustion appears to be responsible for a disorder characterized by pronounced chlorosis of the leaf veins, immaturity of the wood (which was covered with brownish pustules), and shrivelling, discoloration, and disagreeable flavour of the grapes. It is confined to vineyards located for centuries on the same site and is specially prevalent in the best cultivated and manured plots. In fact, severely affected 30-year-old stocks, transferred nearly 20 years ago from a situation of this type to a poor diluvial clay soil in the Institute grounds, recovered during the first year, producing normal yields and making vigorous new growth, with no recurrence of the trouble.

Quite a different type of chlorosis, developing in a fan-shaped pattern over the

leaf surface, between the veins, is widespread throughout the region on different vine varieties, both grafted and self rooted, in all kinds of soil. The symptoms are most conspicuous, however, on two- to three-year-old grafts, especially on stock 44/53. From the third to the fourth year onwards the yellowish to yellowish-white discolorations (which are sometimes accompanied by marginal necroses, spreading inwards) tend to regress and ultimately to disappear altogether. The condition presents close analogies with the Californian Pierce's disease [lucerne dwarf virus].

Newly planted Riesling vines on old volcanic sandy soils in the Winningen district sustain such heavy reductions in growth and yield that they seldom survive the age of 20 years. In the summer of 1953, for the first time, the marked leaf malformations and slight convexity of the veins characteristic of court-noué [16, p. 622 *et passim*] were observed in a 20-year-old plot.

Among the topical problems of virus research discussed by O. Bode (pp. 129–136) on the basis of 27 contributions to the literature are the appearance of viroses in areas hitherto free from them; the numerous virus infections in German tobacco plantations [33, p. 186]; the application of electron microscopy to the study of viruses with a view to their classification according to particle morphology; and the control of virus diseases.

From the Phytopathological Institute, Wageningen, Holland, A. B. R. Beemster (pp. 136–140) reports the experimental demonstration in 1952–3 of the delayed movement of potato virus X in Bintje potato plants upwards of nine weeks old [cf. 32, p. 143; 33, p. 684]. In one test, for instance, the percentage of infected tubers after five weeks in plants 12 weeks old on the day of inoculation was 31, compared with 100 for those inoculated at six to eight weeks.

Grafting experiments were performed by H. Ross (pp. 144–145) at the Max Planck Breeding Research Institute, Voldagsen, in connexion with a study of the extreme resistance (reaction IV) of *Solanum acaule* to potato virus X [cf. 33, p. 552], manifested by a virtual or complete absence of local lesions and no systemic infection. Most of the *S. acaule* plants and interspecific *acaule* hybrids grafted with X 'donors' remained healthy, while the rest developed various types of necrosis. Tests on *Gomphrena* [*globosa*] with sap from plants of the two categories yielded negative and 20 per cent. positive results, respectively. Only 5 per cent. symptomless and virus-free grafts were obtained in tests with hypersensitive varieties, the remainder becoming necrotic and causing 45 per cent. infection on *G. globosa*. The mode of inheritance of the extreme resistance of *S. acaule* is monomeric and proved to be transmissible after four to five back-crossings with cultivated varieties. The progeny have given yields up to 90 per cent. of those produced by the varieties and are, in part, already in the breeders' hands.

M. Klinkowski (pp. 162–168) describes experiments on the inactivation of tobacco mosaic virus by various products of fungal metabolism [cf. 32, p. 60]. The number of local lesions on *Nicotiana glutinosa* leaves was reduced from 67 to nil when the inoculum was mixed in equal parts with three-week-old Czapek-Dox culture filtrates of *Botrytis cinerea* from primula and cineraria, to 0·8 by the same species from geranium, and to 1, 5, and 4, respectively, by three strains of *Rhizoctonia* [*Corticium*] *solani*. In a parallel series of tests with pulped fungus mats the primula, cineraria, and geranium isolates of *B. cinerea* reduced the number of lesions to 0·5, 7, and 4, respectively, but the strains of *C. solani* caused only slight inactivation of the virus. Reductions from 90 to 2 and 5, respectively, were effected by the admixture with the inoculum of an aqueous extract of air dried fruit bodies of *Lycoperdon gemmatum* and the water soluble fraction of the ether precipitate from it. The aqueous extracts of a number of pileate species, at 2:1, untreated and heated for 10 minutes at 100°, also greatly reduced the number of lesions on *N. glutinosa*.

L. Quantz (pp. 171–175) gives a useful summary of the available information on

the virus diseases of broad bean in Germany, comprising true broad bean mosaic [33, p. 588], pea enation mosaic [loc. cit.], pea mosaic, and broad bean leaf roll (reported by Böning under the name of mosaic [7, p. 134]).

From the Pomology Research Station, Jork, H. Böмeke (pp. 175–178) reports investigations on the viroses of fruit trees in the Lower Elbe Valley, where this problem is causing increasing concern. There are three foci of the 'Eckelrade-Pfeffinger-complex' of sweet cherries, in one of which the symptoms are reminiscent of the Eckelrade [strain of the] virus [31, p. 560], while in the other two they are more suggestive of Pfeffinger virus [34, p. 41]. Rasp leaf [cf. 31, pp. 128, 224] without enations occurs in two localities and ring spot [34, p. 41] is slowly spreading here and there. Plums are infected by band mosaic (line pattern) [cf. 33, p. 304] and prune [plum] dwarf viruses; apples by mosaic, flat limb [30, p. 167], and 'stiletto disease' (suspected to be of virus origin and characterized by either cracked or malformed and severely 'rusted' fruits according to the variety); and pears by stony pit [cf. 31, p. 477; 32, p. 386].

Other papers in the virus section were contributed by R. Bartels on the spread of potato virus X [33, p. 588], F. Sprau on potato dwarf shrub virus [31, p. 397], J. Völk on disease spread and aphids [33, p. 496], and D. Noordam on virus diseases in chrysanthemums [32, p. 559].

Gorlenko (M. V.). Достижения фитопатологии в Народной Республике Болгарии. [Phytopathological achievements in the People's Republic of Bulgaria.]—Природа [*Nature, Moscow*], 43, 9, pp. 67–70, 1 col. pl., 1 fig., 1954.

The author reviews the disease situation on cultivated crops in Bulgaria. *Verticillium dahliae* [cf. *R.A.M.*, 26, p. 451] is reported to be responsible for the widespread wilting of [chilli] peppers and eggplants; *Gymnosporangium* spp. [cf. C.M.I. maps Nos. 61, 121, 123] are causing severe infections on pears, apples, quinces, and junipers; rust [*Phragmidium mucronatum*: cf. *R.A.M.*, 33, p. 437] on the Kazanlik rose, two races of which are reported, one attacking red and the other white roses only, is satisfactorily controlled by a 1 per cent. solinone, 2 per cent. Bordeaux mixture, or 4 per cent. formalin spray on both the plant and the soil, followed by 1 per cent. Bordeaux on the plant; *Phyllosticta malkoffi* causes serious damage to cotton; and *Phytophthora* [*parasitica* var.] *nicotianae* [cf. 19, p. 308] is widespread on tobacco.

Wilkins (V. E.). **Report of the technical working party. European Plant Protection Organization.**—19 pp., Paris, 1952. [French and English texts.]

In this report [cf. *R.A.M.*, 32, p. 224] it is stated that wheat flag smut (*Urocystis tritici*), rye smut (*Tilletia secalis*) [33, p. 666; 34, p. 30], and wheat dwarf bunt (*T. tritici nanifica*) [*T. controversa*: loc. cit.] do not call for special import restrictions. A justifiable restriction against strawberry red core (*Phytophthora fragariae*) would be to require a declaration that imported strawberry plants are unaffected and have come from nurseries where infection has not been known to occur. Alternatively, import could be confined to runners produced and certified under a scheme precluding certification of plants from affected land.

Italian exports to Greece of chestnut timber from an area infected by blight (*Endothia parasitica*) [32, p. 595; 33, p. 646] must be steam-sterilized at 80° C. for half an hour. Chestnut fruits imported from Italy into France must come from areas unaffected by the disease and must be treated with 1 per cent. formalin (non-injurious to the nuts) for two hours or 2 per cent. for one hour [loc. cit.]. Studies in Italy suggest that the mycelium does not penetrate the xylem [28, p. 428; 31, p. 408], so that the importation of barked timber should involve little risk. No infection of the nuts has been observed in Europe. *Cryptosporium* [*Crypto-*

stroma] *corticale* [32, p. 221], associated with sooty bark of *Acer pseudoplatanus*, has been found on maple [*Acer* sp.] in Italy; there is no record of the fungus on nursery stock.

Tomato bacterial canker (*Corynebacterium michiganense*), which is widely distributed, does not usually cause serious loss. Stewart's disease of maize (*Xanthomonas stewarti*), which can be seed-borne, is a dangerous disease in Yugoslavia [C.M.I. map No. 41], where it attacks all parts of the plant; seed treatment is impracticable in warm climates. Potato ring rot (*C. sepedonicum*) has not been recorded in Italy. Nothing less than a complete embargo on the importation of potatoes from countries where the disease is prevalent can prevent its introduction elsewhere.

Agricultural Research.—*Rep. Indian Coun. agric. Res., 1951–52*, pp. 11–53, 1954.

In the section of this report [cf. *R.A.M.*, 25, p. 252] dealing with rice (pp. 14–18) it is stated that during the year under review 50,000 acres in Madras were sown with seed treated with organo-mercurials against foot rot [*Gibberella fujikuroi*: 32, p. 177, and next abstract].

In varietal trials the foreign wheats K.G.P.F. 4508, 1521, 4652, 4676, and E. 845 showed a high degree of resistance to the Indian races of *Puccinia graminis* [34, p. 28]. Strain 88 from the Indian Agricultural Research Institute was almost free from infection in the field. Selections from Kenya E.144 × Niphad 4 yielded up to 20 per cent. better than local varieties in Bombay State. In Madhya Pradesh promising rust-resistant lines are being obtained from Ex.117(Kendee) × N.P.114–3–2, Ex.11(60 B–12B–16L) × N.P., 114–3–2, E.B.14 × Ex.73(C. 14112), E.B.76 × Ex.73, and A.113 × Ex.73.

Recent work on gram (*Cicer arietinum*) wilt [33, p. 338] ascribes it to cultivation methods rather than to fungal pathogens. In Bombay three out of 48 selections of *C. arietinum* showed over 77 per cent. resistance to wilt. Four selections of red gram [pigeon pea] resistant to wilt [*Fusarium udum*: 33, p. 711] have been made in Bombay; Yadgir No.3 and C.11 in Hyderabad; and type 17 for moderate resistance in Uttar Pradesh.

The best time for sowing the coriander crop is stated to be the first two weeks of November, as this reduces wilt [? *Fusarium*: cf. 23, p. 407]. The optimum conditions for the development of the disease were a soil temperature of 25° C. and soil moisture content of 50 to 60 per cent.

Experiments in Bombay failed to show any cross-protection against tobacco mosaic virus by inoculating tobacco plants with *Dolichos* enation mosaic virus. *Datura* mosaic virus [21, p. 342; 23, p. 438] was infective at a dilution of IXI 8. *Myzus persicae* readily transmitted the virus from *D. metel* var. *fastuosa* to *D. innoxia*. The cowpea varieties Alacrowder, Early Sugar Crowder, Suwannee, and Taylor were resistant to cowpea mosaic virus [cf. 33, p. 201] while Early Red was tolerant. The little-leaf virus of *Vinca rosea* was transmitted by grafting and by *Eutettix phyciti*, and was shown to be the same as *Cucurbita moschata* [?muskmelon] mosaic and eggplant mosaic virus [28, p. 161]. The papaw mosaic virus [cf. 32, p. 575] was shown by cross-inoculations to be distinct from the mosaic viruses on *Lagenaria* [30, p. 259; 31, p. 531] and *C. moschata*.

Majid (S.). **Annual Reports of the grow more food activities of the Department of Agriculture, Assam, for the years 1951–52 and 1952–53. Part II.**—ii+112+3 pp., 1953; v+107 pp., 1954.

In the section of the 1951–2 report [cf. *R.A.M.*, 31, p. 370] dealing with the plant protection scheme in Assam (pp. 37–43), it is stated that the widespread (though not serious) rice diseases, *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: 30, p. 262] and *Fusarium moniliforme* [*Gibberella fujikuroi*: 33, p. 524 and preceding abstract], were controlled to a large extent by seed treatment with perenox, yellow

cuprocide, and agrosan GN, giving yield increases of 15 to 25 per cent. In seven districts the spraying of a total of 3,155 acres of potatoes with perenox (4 oz. in 10 gals. water) or Bordeaux mixture (4:4:50) six times during the growing period to control *Phytophthora infestans* [31, p. 370] increased crops by an average of 20 to 45 maunds [1 maund = 82·28 lb.] per acre or a gross of 1,972 tons.

The most serious diseases of matima (*Phaseolus mungo*) and mugma (*P. radiatus*) beans were *Colletotrichum lindemuthianum* [loc. cit.] and *Cercospora cruenta* [loc. cit.], both controlled by perenox sprays.

Frequent spraying of citrus trees with perenox, combined with severe pruning and manuring just before flowering, reduced the incidence of scab (*Sphaceloma* [*Elsinoe*] *fawcetti*) [30, p. 263] and other diseases [33, p. 711] and increased fruit production.

The free distribution of pesticides has been discontinued; they are now sold to local farmers at half cost price.

For 1952–3 it is reported (pp. 29–35) that the treatment of 701 acres of potatoes with preventive sprays (chiefly perenox) against *Phytophthora infestans* resulted in a yield increase of 350 tons.

Department of Agriculture, Uganda, Record of Investigations No. 3, for the period 1st April 1950 to 31st March 1952.—93 pp., 1 fig., 1954.

In the botany and pathology section of this report [cf. *R.A.M.*, 32, p. 377] (pp. 1–23) J. D. Jameson and D. G. Thomas give an account of the first two seasons' work, mostly covered by a previous report, on the control of *Xanthomonas malvacearum* on cotton [32, p. 375]. The effect of seed dressing on yield was tested (unreplicated) at Serere, where there is a risk of complications by insect attacks; the plants from perenox-treated seed yielded 1,182 to 1,184 lb. per acre (main stem lesions 11 to 14·3 per cent.) compared with 1,003 (52·8) from the untreated. A summary of all trials (1949–51) showed that plots sown with dressed seed (perenox, agrosan GN, and R 1038) yielded 103 to 107 per cent. of the control, compared with 106 to 119 per cent. for those with dressed seed and given an over-all insecticide spray (BHC or DDT).

The 1950–1 bulk scale test in Teso District with 800 tons of delinted dressed S 47 [loc. cit.] seed showed that in comparison with cotton yields over 27 years there was no evidence of a significant increase in 1948 to 1950, but the 1950–1 treated crop exceeded the previous record by 5,000 bales. S 47 (dressed) gave 307 per cent. of the 1949–50 crop, compared with an average of 126 per cent. increase for the usual seed without treatment in Lango and Mbale. It was estimated that the new variety accounted for 68 per cent. of the increase and the seed dressing for 75 per cent., both much greater than predicted by initial trials. The total cost of the S 47 seed and treatment was £7,200, which yielded a gross return of well over £1,000,000. An attempt is being made to transfer resistance from B 181 and KP 28 to S 47.

Studies on groundnut rosette virus disease [loc. cit.] were continued at Serere in 1949 and 1950. Spacing trials confirmed the observations made in 1934 that close spacing (6 by 6 in., 60,000 plants per acre) reduced the incidence of the disease; in plots of 625 plants, 489 at this spacing were uninfected in 1950, compared with 17 and 132 in 1949 and 1950, respectively, at 24 by 24 in. Incidence was due only to random infection and not to spread from plant to plant.

J. D. Jameson, D. G. Thomas, and D. L. Downie describe virus-like symptoms in coffee (*Coffea canephora*) which include leaf puckering, vein-clearing, coarse mottling or water-soaked patches, and tip burn, but these have not yet been transmitted by grafting. The disorder has been known for many years and is more common in trees out in the open than in the shade. Some varieties seem more susceptible than others.

Annual Report East African Agriculture and Forestry Organization, 1953.—95 pp., 1 pl., [? 1954].

In the plant pathology section (pp. 19–24) of this report [cf. *R.A.M.*, 33, p. 15] H. H. Storey and Mrs. A. K. Ryland give a record of *Puccinia polysora* in Somalia [formerly Italian Somaliland: C.M.I. map No. 237]. The standard technique for resistance tests [*R.A.M.*, 33, p. 420], by which two leaves of each seedling are inoculated with fresh uredospores under humid conditions, appears to classify susceptible plants effectively; it fails, however, to demonstrate possible degrees of susceptibility and gives no indication of the extent to which plants might be damaged by the disease in the field. Those with a hypersensitive reaction might be damaged if subjected to heavy and repeated natural infection. It is emphasized that the tests have been concerned only with seedling resistance and that there is little evidence that this is maintained throughout growth.

Transmission experiments by F[rances] M. L. Sheffield demonstrated that the virus affecting sweet potatoes [33, pp. 16, 48] in the field differed from one another on any one variety only in the intensity of symptom expression. Diseased plants obtained from the Research Station, Kawanda, Uganda, contained viruses which fell into three groups, causing, respectively, very severe, moderately severe, and mild infection. A severe form, identical with the foregoing, affected plants from the Aberdare Mountains, near Fort Hall, and from near Muguga, Kenya. The most damaging virus was obtained from the Jacaranda Experiment Station, near Ruiru, Kenya, which also yielded the mildest form. A virus intermediate in its effects was latent in a plant from Moshi, Tanganyika.

In the section dealing with plant breeding and genetics (pp. 24–30) L. R. Doughty, D. W. Gourlay, and D. L. Jennings state that in field trials of resistance of cassava to mosaic [33, p. 16], disease incidence was above average throughout, possibly owing to closer spacing, which places the trial plants nearer the diseased hedgerows. At Kizugu and near Mombasa, Kenya, none of the clones selected for their high resistance in earlier trials remained entirely unaffected in the later ones, and sometimes a high proportion of the plants succumbed. Near Mombasa incidence was so high that it was decided to harvest at 12 instead of 18 months. This severity may have been due to the presence of abundant diseased material, the close spacing (3 ft.×3 ft.) providing a favourable eco-climate for multiplication of the vector, to conditions favouring the activity of the virus or lowering host resistance, and the presence of a more virulent strain or strains of the virus. Greenhouse infection experiments demonstrated that cassava plants can carry the virus without symptoms, but a setback to steady growth, such as cutting back or defoliation and removal of the terminal bud, may lead to symptom expression.

A collection of all cassava varieties and hybrids ready for distribution has been established at Eldoret, Kenya, as an intermediate quarantine measure against brown streak virus [loc. cit.]. This disease is widespread in the coastal belt of East Africa, but not in up-country areas. As diagnosis is difficult, every precaution must be taken in transferring cuttings to regions free from the disease. In the relatively cold climate of Eldoret any affected plant should die out.

During the year, L. R. Doughty tested 1,086 maize seedlings for resistance to streak [virus: loc. cit.; 33, p. 657], resistant plants being selfed or inter-crossed.

In the plant physiology section (pp. 32–34) J. Glover and C. M. D. Harrison report two spraying trials against pyrethrum [*Chrysanthemum cinerariifolium*] bud disease [*Ramularia bellunensis*: 33, p. 215]. Massive applications of Bordeaux mixture at ten-day intervals reduced the percentage of infected buds and had no markedly injurious effect on bud production. The percentage disease rate was obtained by dividing the total number of diseased buds harvested by total bud production. Statistical analysis confirmed the significant relationship between

numbers of diseased buds and hours during which temperatures were below 50° F. five weeks before and between total bud production below 60° 13 weeks before. The cold, misty spell, which caused the disease to flare up at mid-season, was also responsible for a late flush of flowers. Since the plants must be chilled to start bud development, and the required temperatures are not much above dew-point, bud stimulation and temperatures favouring infection are likely to occur simultaneously, though the persistent recurrence of very high humidities or the dews necessary to start a flare-up is seldom known. On many nights temperatures are very near dew-point for a few hours, and this, together with the slow drying of the well-sheltered clumps, helps to maintain the disease, if only at a low level.

In the soil microbiology section (pp. 45–47) Miss J. Meiklejohn states that very few fungi were obtained in plate counts of soils from the Muguga Farm, the highest figure being only 100,000 per gm. Actinomycetes, however, were usually even more numerous than bacteria.

J. S. Hemingway (pp. 84–85), in pathological studies, describes a disease of groundnuts occurring at Nachingwea, Tanganyika, characterized by a partial to complete wilting of the foliage after pod setting; temporary recovery may set in during the early stages. Internal symptoms are a yellowing of the cortex of the main root and the production of blind pods or ones with only partially developed seed. No pathogen appears to be associated with the condition.

Annual Report of the Department of Agriculture and Forestry, Dominica, for the year 1952.—33 pp., [? 1954. Mimeographed.]

In the section on pests and diseases of this report [cf. *R.A.M.*, 33, p. 590] it is again emphasized that one of the major diseases of banana is leaf spot [*Mycosphaerella musicola*: 33, p. 708; cf. next abstract]. Incidence was high in 1952 owing to inadequate control measures. [The tomato wilt referred to in the 1945 and 1949 reports was probably due to *Pseudomonas solanacearum*.]

Goodban (J. W. D.). **Report of the Department of Agriculture, British Honduras, for the year ended 31st December, 1952.**—25 pp., [? 1953].

In this report [cf. *R.A.M.*, 29, p. 12] it is stated that bananas suffered severe damage from *Cercospora* leaf spot [*Mycosphaerella musicola*: loc. cit.; cf. preceding abstract] and the acreage was cut from 1,500 to 850 acres. Ramie (*Boehmeria nivea*) was affected by a wilt that appeared in small patches during the dry season and early rains. A basidiomycete was present, but its role in the wilt syndrome is not yet determined. *Sclerotium rolfsii* occurs in many areas and is liable to damage flower and vegetable crops.

Síntesis Memoria Anual años 1948–1951. [Summarized Annual Report for the years 1948–51.]—*Rev. industr. agríc. Tucumán*, 38 (*1948–52*), 1–12, pp. 57–90, 1952. [Received 1954.]

In the phytopathology section (pp. 79–81) of this report from Argentina [*R.A.M.*, 29, p. 501] it is stated that in varietal trials the sugar-cane variety Tuc. 3342 suffered the highest percentage of attack by pokkah boeng (*Fusarium moniliforme* [*Gibberella fujikuroi*] and *F.m.* [*G. f.*] var. *subglutinans*) [cf. loc. cit.], i.e., 8·6 per cent. out of more than 3,000 young canes and 18·5 per cent. of mature plants.

Stout (G. L.). **Bureau of Plant Pathology.**—*Rep. Dep. Agric. Calif., 1952* (*Bull. Dep. Agric. Calif.*, 41, 4), pp. 265–283, 2 figs., 1952.

In this report [cf. *R.A.M.*, 32, p. 615] it is stated that angular leaf spot of cucumber (*Pseudomonas lacrymans*) [33, p. 520], not usually seen except under glass in California, appeared in several localities. G. E. Alstatt reports that internal cork virus was found in only three sweet potato plantings (all in Merced county). All

roots from these were sent for processing to prevent propagation of the virus. There were 13 new infections of *Sclerotium rolfsii* on *Dichondra* spp.

R. L. McClain reports that citrus quick decline [32, p. 622; 33, p. 671] made little progress in the lightly infected areas, but in the Bardsdale and Sespe Canyon provisional zones in Ventura county there was a very great increase in the number of affected trees, a few being found also in the regulated area round these zones. Continued rapid spread was noted in the older infected areas of Los Angeles, San Bernardino, and Orange counties. Outside the quarantined area the disease was found only on one orange tree (in the San Luis Rey Valley, the first record for San Diego county).

A. Schlocker states that 1,008 new tree cases of yellow leaf roll virus [33, p. 433] were found on peach and nectarine trees on 96 properties. All were removed or destroyed. Of these, 125 were found on 51 properties not before infected. New identifications of peach western X-disease [? strain of peach X-virus: 33, p. 735] on peach and nectarine numbered 1,050 on 305 properties, 142 of these properties having no previous record of the disease. Peach yellow bud mosaic virus [32, p. 615] was found on 673 trees on 37 properties in Placer county. Elsewhere 321 newly infected peach and nectarine trees were discovered on ten properties, nine of which had no previous history of the disease. All the infected trees were moved.

A. M. French states that during 1952 1,971 peach trees were found to be affected by peach mosaic virus on 523 properties, 125 properties being infected for the first time. No infections were found in nursery stock.

H. K. Wagnon gives details of the work on the certification of virus-free stocks. Two peach trees showed symptoms of peach calico virus [24, p. 65], not previously recorded from California. Following an inspection of 200 acres, bud failure [32, p. 615] was found for the first time on Marcona almond, four trees being affected.

A. P. Messenger (pp. 245–264) deals with the work of the Bureau of Plant Quarantine [cf. 31, p. 228].

Sixty-eighth Annual Report for the year ending June 30, 1951, Agricultural Experiment Station, Wisconsin. Part II (*Bull.* 498).—73 pp., 21 figs., 1 map, 1952.

In this report [cf. *R.A.M.*, 21, p. 441] it is stated that the severe leaf curl of cherry trees in Wisconsin is apparently due to potassium deficiency [30, p. 421]. When treated with nitrogen, alone or with 5 to 10 lb. high potassium fertilizer, the trees yielded, respectively, 6½ (60 per cent. mature), nearly 11, and 15½ (87·5 per cent. mature) pails of cherries. The fruits on the potassium-treated trees were larger and ripened more evenly.

Lines of mid-season and late cabbage have been established which are completely resistant to yellows [*Fusarium conglutinans*: 33, p. 459] and also highly resistant to club root [*Plasmodiophora brassicae*: cf. 23, p. 372]; resistance is not fixed, but it is thought that the continual selection of resistant plants for seed production may keep club root at a manageable level.

Inbred lines of maize contain sub-lines with varying degrees of resistance to seedling rot caused by *Pythium* [spp.: 33, p. 667]. Seed grown and matured in a short, cool season or taken from late plantings was less resistant than that grown in a good season or taken from early plantings. Resistance appears to lie in the embryo. Inbred lines which germinate and grow rapidly are more resistant than those which grow slowly. High temperatures, persisting for a few days after planting and followed by lower ones, are more injurious to maize than cold at planting with warmer conditions later.

New strains of tobacco developed in Wisconsin were up to 98 per cent. resistant to wildfire [*Pseudomonas tabacum*: cf. 31, p. 368; 33, p. 765].

Healthy wild tobacco plants inoculated with the necrotic spot strain of potato

virus X, which had exhibited no natural mutation over several years in the laboratory, and then exposed to nitrogen mustard gas [cf. 32, p. 6] developed chlorotic or yellow spots in addition to the necrotic lesions. Transfers from the former produced four different types of lesion, which were perpetuated in further transfers and were subsequently proved to be strains of virus X.

Akai (S.) & Oishi (C.). **On the effect of expressed sap of plant cells upon the activity of protopectinase of Bacillus carotovorus.**—*Forsch. PflKr., Kyoto*, 5, 1, pp. 15–17, 1954.

At the Laboratory of Phytopathology, Kyoto University, Japan, it was demonstrated that the sap (at pH 8) of radish, carrot, and onion accelerated the protopectinase activity of *Bacillus carotovorus* [*Erwinia carotovora*], as measured by the disintegration of radish root slices, whereas the process was inhibited by sap from squash petioles.

Tolba (M. K.) & Ghanem (S. S.). **Studies on bacterial nutrition I. Utilization of different sugars or mixtures of sugars by three soft rot bacteria. II. Effect of some micronutrient elements on respiration and sugar utilisation by three soft rot bacteria.**—*Bot. Notiser, 1954*, 2, pp. 154–166; 3, pp. 207–216, 1 diag., 18 graphs, 1954.

The utilization of sugars and the effect of the presence in the culture media of different concentrations of iron, copper, and zinc on the respiration and utilization of glucose by *Bacterium* [*Erwinia*] *aroideae*, *B. carotovorum* [*E. carotovora*], and *B. phytophthorum* [strain of *E. carotovora*] was studied in the Botany Department, Cairo University [cf. *R.A.M.*, 31, p. 174]. The three bacteria exhibited considerable differences in sugar utilization. The presence of iron and zinc did not materially affect the rate of glucose utilization by these species, but an increase in the copper concentration was accompanied by a drastic fall in the amount used. The presence of iron significantly increased the rate of carbon dioxide output by each species, while the presence of copper significantly decreased it. Zinc appeared to have no appreciable effect on the respiration rate.

Grimaldi (J.). **Les maladies cryptogamiques du Cacaoyer au Cameroun.** [The cryptogamic diseases of Cacao in the Cameroons.]—*Agron. trop., Nogent*, 9, 5, pp. 544–562, 18 figs., 1954. [English and Spanish summaries.]

Notes are given on the symptoms, causal organisms, and control of the chief fungal diseases of cacao in the French Cameroons. Of these, only pod rot (*Phytophthora palmivora*) [cf. *R.A.M.*, 33, pp. 340, 412], die-back caused by capsid injury in association with *Calonectria rigidiuscula* [cf. 33, p. 758], and root rot (*Armillariella* [*Armillaria*] *mellea*) [cf. 26, p. 235; 28, p. 272] are of economic importance. Mealy rot (*Trachysphaera fructigena*) [C.M.I. map No. 249] is present. In the Subdivision of Ambam about 10 per cent. of the young pods are attacked by *Colletotrichum gloeosporioides* [see next abstract]. Die-back has been present locally for many years; on his arrival in 1950 the author found it at Ntui in the Bafia area. Since then, the affected areas seem to have become more numerous, mainly in the Dja-Lobo and Ntem districts. Most of the growers stated that the disease had appeared not more than three years previously. In 1952 certain plantations along the Sangmélima-Djoum road and in the canton of Bengbis (both in the Dja-Lobo district) were found to be affected. The disease was controlled by excision of the infected wood and spraying with Bordeaux mixture and an insecticide. White thread (*Marasmius scandens*) [cf. *R.A.M.*, 14, p. 153] is present, usually accompanied by horse-hair blight (*M. trichorrizus*) [*M. equicrinis*: cf. 33, p. 412].

Wellman (F. L.). **Some important diseases of Cacao.**—*F.A.O. Pl. Prot. Bull.*, 2, 9, pp. 129–133, 1954.

The author reviews current information on the principal diseases of cacao [*R.A.M.*, 33, p. 526], with special reference to symptoms, causes, and control. The spores of *Monilia roreri* [loc. cit.; 24, p. 272; 33, p. 593] germinate on moist pods but are able to penetrate only very young pods or older ones when ripe and wounded. The fungus grows internally with the developing pod. For a long time after penetration there is no external symptom. Then the pod darkens and becomes irregular in shape, immature green pods of yellow varieties often having yellow blotches, while those of red varieties may have orange markings. Internally there are streaks and a dark marbling; the seeds are soft and may eventually liquefy. Later, large brown areas surrounded by yellow borders develop on the pods, which become covered with a white mycelium bearing buff spores.

Anthracnose (*Colletotrichum gloeosporioides*) [loc. cit. and preceding abstract] may be virtually eliminated by using resistant clones, adopting proper cultural methods, and spraying with copper fungicides.

Diplodia [*Botryodiplodia*] *theobromae* [cf. 30, p. 181; 33, pp. 143, 412] can cause serious losses when conditions favour infection. It is most severe in poorly managed plantations; trees weakened by other diseases or unsatisfactory nutrition are also liable to attack.

Brief notes are also given on a number of other cacao diseases which appear to be increasing.

Renaud (R.). **Les maladies à virus du Cacaoyer de l'Ouest africain.** [The virus diseases of Cacao trees in West Africa.]—*Agron. trop., Nogent*, 9, 5, pp. 517–543, 1 pl., 12 figs., 1954. [English and Spanish summaries.]

A detailed account, taken from the literature (2½ pages of references), is given of the cacao swollen shoot virus [*R.A.M.*, 34, p. 22]. More than half the cacao-growing area of the Ivory Coast [29, pp. 204, 252] is considered to be more or less severely affected. Indenié as a whole is attacked by the Sankadiokro form of the disease [loc. cit.] or by closely related strains. Between Agnibilekro and the south of Sankadiokro lies a zone of massive infection, with many less important foci of infection scattered about the rest of the area. To the south of Agnibilekro (at Kongodia, Damé, N'Dakoissikro and in the vicinity) there is a small area where the virulent Kongodia strain [loc. cit.] is present. Also in the eastern part of the Territory the great area of infection in Abengourou is succeeded further south in the Subdivision of Adzopé, Aboisso, and Bassam by a series of foci of varying importance in which several viruses or distinct strains are probably present.

Towards the west, the Daloa–Issia area [loc. cit.], in which the sparse cacao bushes are in bad condition and less productive, may be considered completely affected. In addition to this great centre of the disease, the most westerly known, there are isolated patches in adjoining areas, in particular Gagnoa. The disease has not yet been found in the highly important productive area of Bougouanou, in Tiassalé, or in the Divo–Gagnoa–Lakota triangle, though a probable report came recently from near Guibri, south of Divo. The lagoon zone, Dabou–Abidjan–Bingerville, also appears to be unaffected, as are southern Boudoukou and M'Bahiakro, both on the northern limit of cacao cultivation.

The Kongodia and Sankadiokro strains may both be present in the same locality, as they are, for example, in the village of Damé. The fall in production at Kongodia has been very heavy. In 1949–50 a group of 113 trees affected for about 1½ years averaged 1·25 pods per tree, as against 24·02 for 242 apparently healthy ones; 91 per cent. of the pods borne on the affected trees were gathered during the first picking, as against 38 per cent. for the controls. The Sankadiokro form of the disease varies with the tree and environmental conditions and becomes progressively

modified following infection. After a period which differs according to the climatic conditions prevailing in any year, this form can cause a slight but statistically significant increase in yield. The differences in production between healthy and affected trees, even after ten years, do not appear to be great.

Renaud (R.). **Les moisissures du Cacao marchand.** [The moulds attacking marketable Cacao.]—*Bull. Cent. Rech. agron. Bingerville* 7, pp. 45–64, 1953. [Received 1954.]

In this review, based on the literature (24 titles), the author deals with the organisms causing mould of harvested cacao pods [*R.A.M.*, 33, p. 526 and next abstract], the factors favouring mould development and governing their appearance, conditions prevailing in the Ivory Coast during the 1952–3 season, and the effect of mould damage on the quality of the manufactured product. More than 50 species of fungi have been recorded, the most important being species of *Aspergillus* (including *A. fumigatus*, *A. flavus*, *A. glaucus*, *A. tamarii*, and *A. niger*) and Mucorales. Preventive measures recommended to the producer comprise roguing rotten, over-ripe, or cracked pods, crushing and fermenting as soon as possible after harvest, rapid drying (by artificial means if necessary), maintaining the product after drying at a water content below 8 per cent. and a degree of humidity below 82 [per cent.], and immediate drying if the product comes into contact with rain.

Renaud (R.). **La qualité du Cacao. Les moisissures des fevès fermentées.** [The quality of Cacao. The moulds of fermented beans.]—*Agron. trop., Nogent*, 9, 5, pp. 563–583, 1954. [English and Spanish summaries.]

After stating that during the past three years the quality of the cacao exported from the Ivory Coast has greatly declined as a result of mouldiness [see preceding abstract], 64 per cent. of the samples examined at the end of 1952 having the maximum amount of mouldiness permitted, the author lists all the organisms which might be present on cacao beans during their preparation, and reviews and discusses (72 references) the available information on the conditions which favour the development of moulds, and their control.

De Urries (M. J.) & Cañamas (R.). **Razas fisiológicas de 'Puccinia graminis tritici' y 'P. rubigo-vera tritici' en España, en el período 1950–52.** [Physiologic races of *Puccinia graminis tritici* and *P. rubigo-vera tritici* in Spain during the period 1950–52.]—*Bol. Inst. Invest. agron., Madr.* 27, pp. 593–616, 4 graphs, 2 maps, 1952. [English summary. Received 1954.]

A survey of the physiologic races of *Puccinia graminis tritici* [*R.A.M.*, 32, p. 425] and *P. rubigo-vera tritici* [*P. triticina*: 33, p. 716 and next abstract] present on wheat was made in Spain during 1950–2. Races 9, 19, 94, and 176 of *P. graminis* were recorded, bringing the total for the country to 17. Most of the races isolated from *Berberis hispanica* are regarded provisionally as new.

Four new races of *P. triticina* are proposed. B, D, 4, and 84 are considered to belong to one group. These races and 11, 14, and 26 (Chester's group 11) [26, p. 239; 34, p. 29] comprise almost all the races of *P. triticina* known in the country.

Cañamas (R.) & De Urries (M. J.). **Reacción de una colección de Trigos del Centro de Cerealicultura a las razas 14, 21 y 24 de 'Puccinia graminis tritici'.** [Reaction of a collection of Wheats from the Centre of Cereal Culture to races 14, 21, and 24 of *Puccinia graminis tritici*.]—*Bol. Inst. Invest. agron., Madr.* 27, pp. 573–588, 1 diag., 1952. [English summary. Received 1954.]

Of various wheat varieties tested in the greenhouse at the Botanic Garden, Madrid, the Experiment Station for Horticulture and Gardening, and in the field

at La Canaleja for reaction to races 14, 21, and 24 of *Puccinia graminis tritici* [cf. *R.A.M.*, 31, p. 276 and preceding abstract], the majority were highly susceptible. In the seedling stage, Aquila, Escondido, and Funo were adequately resistant to races 14 and 24 and Conti 83 was almost immune from race 14. Conti 83, Baart 38, Carleton, Stewart, Wase Nybai, Hybrid D, Serodio, and hybrids 111–13 and 112–1 were outstanding in the mature plant stage for their freedom from infection by all three races, partly because they largely escaped infection. Baart 38, Wase Nybai, and 111–13 and 112–1 were susceptible in the seedling stage. Some varieties which were susceptible as seedlings appeared to grow even more susceptible subsequently.

Trentin (A.). **Prove di lotta contro la carie. Spighe e cariossidi cariate in colture di Grano provenienti da semente artificialmente contaminata.** [Experiments on the control of bunt. Bunted spikes and caryopses in plantings of Wheat grown from artificially contaminated seed.]—*Notiz. Malatt. Piante, 1954*, 26 (N.S.5), pp. 7–10, 1954.

Answering a criticism brought against his earlier paper on the control of wheat bunt (*Tilletia* [*caries* and *T. foetida*]) by certain dusts [*R.A.M.*, 33, p. 529] that the results given applied only to the spikes, the author tabulates those for the grain. All the materials which completely controlled infection on the spikes also controlled it completely on the grain. Where only partial control was effected, there was an almost constant correlation between infection rates on the two organs. Therefore the results do apply to both.

Chemical spray fights snow mold.—*Seed World*, 75, 5, pp. 46–47, 3 figs., 1954.

Ceresan M–2 × (1½ lb. is equivalent to 5 lb. ceresan M) applied as a spray (2½ lb. in 20 gals. water) or dry mixed with 40 lb. nugreen per acre in tests at Fairfield and Tetonia, Idaho, in 1953–4 gave excellent control of wheat snow mould [*Typhula idahoensis*, *T. itoana*, and *Calonectria nivalis*: *R.A.M.*, 33, p. 21].

Sill (W. H.), Lowe (A. E.), Bellingham (R. C.), & Fellows (H.). **Transmission of Wheat streak-mosaic virus by abrasive leaf contacts during strong winds.**—*—Plant Dis. Reptr*, 38, 7, pp. 445–447, 1954. [Multilithed.]

At Kansas Agricultural Experiment Station and the Field Crops Research Branch, Agricultural Research Service, experiments in a wind tunnel indicated that a small amount (and probably less under field conditions) of transmission of the wheat streak mosaic virus [*R.A.M.*, 33, p. 717] may occur during strong winds because of direct abrasive leaf contact between diseased and healthy wheat plants. Soil particles in the wind did not increase the percentage of transmissions. Grazing and trampling by livestock and movement of machinery did not increase transmission in the field. Further evidence was obtained that *Aceria tulipae* is an important vector [loc. cit.].

White (N. H.). **The growth of Erysiphe graminis hordei on susceptible and resistant varieties of Barley.**—*J. Aust. Inst. agric. Sci.*, 20, 2, pp. 126–127, 1 fig., 1 graph, 1954.

Histological studies at the Plant Pathology Laboratory, University of Sydney, on barley leaves infected with powdery mildew (*Erysiphe graminis*) showed that the growth rate of the pathogen is limited by the number of haustoria formed. In a susceptible variety the number of haustoria produced permitted a progressive increase in the growth rate of the hyphae; on a resistant variety only one haustorium was formed (or very rarely two) by each colony during the four days that succeeded inoculation, with the result that the growth rate of the hyphae dropped

after the second day, reaching zero on the fourth. Inhibition of haustorial development appeared to be due to the collapse of the mesophyll cells and not to the death of the infected epidermal cells. In highly resistant hosts a mean of six mesophyll cells had collapsed beneath each infection court two days after infection, and 14 by the end of four days. In the susceptible host this did not occur even up to seven days after inoculation.

Simons (M. D.). **A North American race of crown rust attacking the Oat varieties Landhafer and Santa Fe.**—*Plant Dis. Reptr*, 38, 7, pp. 505-506, 1954. [Multilithed.]

At the Field Crops Research Branch, Agricultural Research Service, and Iowa Agricultural Experiment Station, Ames, two isolates of a new race, 263, of oat crown rust (*Puccinia coronata*) [*R.A.M.*, 34, p. 31] were identified from material obtained from Manitoba, Canada. Of the 25 oat varieties and strains tested, Ukraine and Victoria were resistant and the *Avena strigosa* varieties Saia and Glabrota highly so.

Murphy (H. C.) & Atkins (R. E.). **Clintafe Oats—its record.**—*Iowa Fm Sci.*, 7, 5, pp. 71–73, 3 figs., 1952.

The oat variety Clintafe [*R.A.M.*, 32, p. 372] averaged only 4 per cent. crown rust [*Puccinia coronata*: see preceding abstract] over three years (1950–2) in Iowa, compared with 50 per cent. for Clinton, and it yielded 8 bush. per acre more.

Le Conte (J.). **Sélection du Maïs blanc menée en Nigéria contre la rouille (Puccinia polysora).** [Selection of white Maize carried out in Nigeria against rust (*Puccinia polysora*).]—*Bull. Cent. Rech. agron. Bingerville* 7, pp. 78–80, 1953. [Received 1954.]

Maize varieties carrying resistance to rust (*Puccinia polysora*) [see above, p. 83] mostly originate from Mexico and Guatemala, the latter including Big Joe and Tsolo. The author reviews the work in progress and envisaged in Nigeria [*R.A.M.*, 32, p. 676] on breeding for rust resistance and on the biology of the disease. Studies are to be conducted at 15 stations in southern Nigeria and will be repeated in the Gold Coast and at Niaouli, Dahomey.

Roane (C. W.). **Genetic variation and cytology of Helminthosporium carbonum Ullstrup and the importance of the pathogen in the development of disease-resistant Maize.**—*Diss. Abstr.*, 14, 4, p. 579, 1954.

At the University of Minnesota a single spore of *Helminthosporium carbonum* race 1 from maize [*R.A.M.*, 31, p. 380] was cultured through two more monoconidial generations until there were 200 isolates in the second and 150 in the third. The isolates differed considerably in topography, sporulation, pigmentation, and rate of growth. Those selected at random from the second and third generations, although culturally diverse, all conformed to the original race 1 as regards pathogenicity. The mycelial cells each contained 0 to 8 nuclei which may move from cell to cell through the septal pore, and several appear to pass into the spore bud from the conidiophore. The cells of the conidia are multinucleate and during germination rapid nuclear divisions take place in germ-tubes which are multinucleate even at the tips.

It has been possible to select for resistance by inoculating young plants in the nursery. The inheritance of resistance to race 1 was studied using inbreds H 7, K 44, and Mp 1 as susceptible parents and C.I.7, C.I.187–2, Hy, K 41, and Mo.940 as resistant.

The single recessive gene *hm* conditioned susceptibility to *H. carbonum* race 1 [loc. cit.] in the three susceptible lines. One or more genes linked with *hm* are

lethal in certain gametic or zygotic combinations. In the crosses Hy × K 44 and K 44 × K 41 the ratios observed may be explained if it is assumed that *hm* is linked with genes such as *ga*, which retards pollen tube growth, and *zl*, which is lethal to zygotes when homozygous.

LUTTRELL (E. S.). **Diseases of Pearl Millet in Georgia.**—*Plant Dis. Reptr*, 38, 7, pp. 507–514, 5 figs., 1954. [Multilithed.]

In this review of the diseases of pearl millet (*Pennisetum glaucum*) in Georgia it is stated that the most common leaf spots are those caused by *Helminthosporium stenospilum* and *H. sacchari* [*R.A.M.*, 33, p. 102], occurring chiefly in the Coastal Plain, and *Cercospora penniseti*, most serious in the Piedmont. Zonate leaf spot (*Gloeocercospora sorghi*) [cf. loc. cit.], *Rhizoctonia* blight (*R.* [*Corticium*] *solani* and *R. zeae*), southern blight (*Sclerotium rolfsii*) [loc. cit.], and rust (*Puccinia penniseti*), not previously recorded in the United States [C.M.I. map No. 225], are all of minor importance. Leaf moulds (*Curvularia lunata*, *C. geniculata*, and *C. maculans*) are abundant, *C. lunata* being the most common; *C. maculans* was observed only once. Head moulds, largely responsible for poor germination of the seed harvested, include *Oidium tenellum* which is practically harmless; *H. stenospilum* (or *H. sacchari*), *H. rostratum* [*R.A.M.*, 26, p. 337], and *C. lunata*, causing blackening of individual grains; and a species of *Fusarium*, probably *F. moniliforme* [*Gibberella fujikuroi*].

NAUDE (C. J.). **Fertilisation of Citrus.**—*Fmg in S. Afr.*, 29, 341, pp. 351–357, 371, 5 figs., 1954.

Notes are given on the recognition and correction by soil amendments of deficiencies of the macro-elements which are liable to occur in South African citrus plantings [*R.A.M.*, 20, p. 531] and also on the symptoms and control by spraying, of deficiencies of the minor elements [32, p. 429] zinc [33, p. 721], copper, manganese, and iron [cf. 34, p. 33]. The importance of correct preparation of the soil before planting and of green-manuring afterwards is indicated. In most South African orchards phosphorus must be applied regularly. Potassium appears to be adequate in most parts, but in eastern Transvaal much higher yields have been obtained following potash fertilizers. Magnesium deficiency is common in the eastern Transvaal Lowveld.

OLSON (E. O.) & MCDONALD (J. R.). **Tristeza in Satsuma varieties in Texas.**—*Plant Dis. Reptr*, 38, 7, pp. 439–442, 1954. [Multilithed.]

Citrus tristeza virus [*R.A.M.*, 33, p. 721 and next abstract] was shown by graft transmission experiments to infect 17 satsuma orange varieties on various rootstocks and Meyer lemon tops on trifoliate orange (*Poncirus trifoliata*) in a variety collection near Winter Haven, Texas. Satsuma trees over 20 years old on certain citrange stocks still lived and bore fruit though infected with the virus, thus confirming previous findings that some citranges are tolerant [cf. 30, p. 411]. Tristeza virus may be a contributory cause of the 'Winter Haven decline' [33, p. 79].

CAMP (A. F.), DUCHARME (E. P.), & KNORR (L. C.). **Tristeza information for Florida Citrus growers.**—*Bull. St. Plant Bd Fla* 2, 31 pp., 4 figs., 1953.

This publication presents in popular terms the current position with regard to the citrus tristeza virus disease [see preceding abstract] with particular reference to the problem in Florida [*R.A.M.*, 33, p. 601]. Methods of control, including inarching with tolerant stocks, or inducing self-rooting, are described, but it appears that the most satisfactory results are obtained in the long run by interplanting younger susceptible groves, or replanting older ones, with trees on tolerant stocks.

Giacometti (D. C.) & Storey (W. B.). **Citrus quick decline discovered in Hawaii.**—*Calif. Citrogr.*, 37, 9, p. 357, 1 fig., 1952. [Received 1954.]

Severe stem-pitting (a symptom of quick decline) was observed in Mexican lime and Lakeland limequat growing in the citrus variety orchard at the Hawaii Agricultural Experiment Station, Poamoho Farm, Oahu [C.M.I. map No. 289], accompanied by stunting and branch distortion. Less severe pitting occurred in Kusaie and Rangpur lime, Golden Buckeye, Washington, and Carter navel orange, and Mediterranean sweet orange. In Victoria and Thong Dee shaddocks and Marsh, Davis, Bowen, and Sunshine grapefruits, pitting was slight, and there was none in Kona and Valencia oranges, Eureka, Villafranca, and Meyer lemons and rough lemon, Wase and Kara mandarins, Tahiti lime, Nagami and Nippon kumquats, and calamondin. All the above are on rough lemon rootstocks. The disease appears to be widespread on Oahu; it may have been imported from California [*R.A.M.*, 33, p. 671] in diseased nursery stock. The vectors *Aphis citricidus* and *A. gossypii* occur throughout the islands.

Winston (J. R.) & Meckstroth (G. A.). **Control of Orange decays by pyrrolidine alone and mixed with 2-aminopyridine.**—*Proc. Fla hort. Soc.*, 65, pp. 78–83, 1952.

At Orlando, Florida, tests with stored oranges, some of which had been gassed, demonstrated the efficacy of 5 per cent. pyrrolidine in controlling green mould (*Penicillium*) [*digitatum*: *R.A.M.*, 30, p. 454] and of 5 per cent. 2-aminopyridine against *Phomopsis* stem-end rot [*Diaporthe citri*: 31, p. 543]. A mixture of equal parts of the two chemicals was more effective in preventing decay from all causes than either used separately, and appeared superior, particularly over long periods, than dowicide A plus hexamine [33, p. 470]. Further tests on possible toxicity to the consumer are necessary before the method can be recommended for commercial use.

Kent (G. C.). **Cadang-cadang of Coconut.**—*Philipp. Agric.*, 37, 5–6, pp. 228–240, 4 figs., 1953. [Received November, 1954.]

This is an account of current knowledge of the history, distribution, economic importance, symptoms, etiology, and transmission of, course of infection by, and tentative control measures against cadang-cadang disease of coco-nut palms in the Philippines [*R.A.M.*, 33, p. 152], based entirely on the literature (10 titles). D. De Leon and A. E. Bigornia (U.S. Mutual Security Special Technical and Economic Mission, Manila, Philippines, 1953) believe that the same or a similar disease occurs naturally on other palms, including *Areca catechu*, *Adonidia merrillii*, *Corypha elata*, *Caryota cummingii*, and *Livistonia rotundifolia*. Attempts to transmit it to three species of palm and 19 other plant species have been unsuccessful so far.

By 1953 the disease had destroyed about 5,527,000 coco-nut palms in the Bicol area, representing a financial loss of about ₱22,000,000 (export value ₱350,000,000: C. A. Calica and A. E. Bigornia: Paper read at 8th Pacific Science Congress, Quezon City, Philippines, November, 1953). It is estimated that nut production ceases about a year after the appearance of symptoms. In the later stages the crown is reduced to eight to ten short, stiff, upright, bronze-yellowish leaves in a tuft at the top of the stem with a few drooping, dead, older leaves about to fall from the trunk. The growing point finally dies in two and a half to seven years and all leaves drop. Leaf symptoms typical of cadang-cadang have been observed recently in 25 palms four to eight years old [cf. *R.A.M.*, 30, p. 227]. Diagnosis in seedlings is difficult since some of the symptoms cannot be determined (De Leon & Bigornia). The entire syndrome appears to indicate an early and progressive destruction of the chlorophyll and a resultant starvation of the plant. None has been known to recover. Several species of nematodes have been found in the crowns of palms in

an advanced stage of disease. Tests with 36 insect species resulted in symptom transmission to one tree out of five by *Cicadella unimaculata* in 242 days and to two out of ten by *C. bipunctifrons* in 178 and 210 days. T. G. Fajardo (8th Pacific Science Congress) has propounded his reasons for suspecting that the condition is due to a nutrient deficiency.

The results of possible control measures and attempts to discover a resistant strain or variety are awaited.

Brinkerhoff (L. A.), Oswalt (E. S.), & Tomlinson (J. F.). **Field tests with chemicals for the control of Rhizoctonia and other pathogens of Cotton seedlings.**—*Plant Dis. Reptr*, 38, 7, pp. 467–475, 3 graphs, 1954. [Multilithed.]

In experiments at Stillwater and Chickasha, Oklahoma, for the control of *Rhizoctonia* [*Corticium*] *solani*, responsible for severe seed decay, pre-emergence injury, damping-off, and sore shin of cotton [*R.A.M.*, 33, p. 81], 50 per cent. Mathieson 275, applied to the soil in the seed row at 4 or 8 lb. per acre, was effective in artificial infestation tests. Seed decay and pre-emergence injury, prevalent during cold, wet weather in naturally infested soil, when a second pathogen may have been present, were not improved, though thiram (50 per cent.) at 13 and 27 lb. per acre gave reasonably good control under these conditions. Seed treatment, particularly with thiram naugets slurry at 6 gm. per kg. seed, was of considerable value but failed to give adequate protection with a high inoculum level or under conditions favouring post-emergence injury. Emergence from fuzzy seed was best during cool, wet weather and from acid-delinted seed when temperatures favoured rapid germination.

Mouton (A.). **Phymatotrichum omnivorum (Shear) Dug., pourridié du Cotonnier.** [*Phymatotrichum omnivorum* (Shear) Dug., root rot of Cotton.] *Rev. Mycol.*, 18, *Suppl. colon.* 2, pp. 69–87, 1 fig., 1953. [Received September, 1954.]

The author gives a general account (with 46 references) of the available information on cotton root rot (*Phymatotrichum omnivorum*) [*R.A.M.*, 33, pp. 26, 537; C.M.I. map No. 15].

Drechsler (C.). **Production of aerial arthrospores by Harposporium bysmatosporum.** *Bull. Torrey bot. Cl.*, 81, 5, pp. 411–413, 1 fig., 1954.

Harposporium bysmatosporum [*R.A.M.*, 26, p. 106] was recently found to subsist by destroying numerous eelworms referable to *Rhabditis* sp. In culture it formed chains of colourless, rod-shaped spores, three to six to a chain, often including ten to 15 catenulate branches. The disjointed arthrospores, which remained strewn on the substratum, commonly measured 10 to 20 μ long and 2·3 to 2·7 μ wide.

Bhattacharyya (J. P.) & Bose (R. G.). **Fungi growing on rot-proofed Jute cloth.** —*Sci. & Cult.*, 20, 4, pp. 189–191, 1954.

Of the 26 fungi isolated from rot-proofed jute hessian, following exposure to weathering on the roof of the Indian Jute Mills Association Research Institute, Calcutta [cf. *R.A.M.*, 32, p. 94], *Aspergillus niger*, *A. japonicus*, *Cephalosporium* sp., and *Pullularia pullulans* were predominant on material proofed with copper compounds or pentachlorophenol. *Paecilomyces varioti*, *Trichoderma viride*, and *Penicillium citrinum*, all weak cellulose-decomposers, occurred on rot-proofed samples outdoors and on unproofed jute goods damaged in service or in the laboratory. *A. nidulans* and *Heterosporium* sp. were resistant to pentachlorophenol but not to the other treatments tried, while the reverse was true of *A. terreus* and *A. sydowi*. *A. proliferans* and *P. tardum* were found only on indoor-exposed, copper-proofed samples. None of the species isolated from copper-containing fabric was able to grow in the presence of 0·025 per cent. copper in laboratory tests

and none showed any marked activity when grown on liquid medium containing filter paper and jute as sources of carbon.

Summers (T. E.). **Physiologic specialization of Colletotrichum hibisci Poll. on Kenaf.** —*Plant Dis. Reptr*, 38, 7, pp. 483–486, 2 figs., 1954. [Multilithed.]

In studies carried out in the field near Lake Worth, Florida, and in the greenhouse at the Everglades Experiment Station, Belle Glade, three physiologic races of *Colletotrichum hibisci* were differentiated on pure line selections of kenaf (*Hibiscus cannabinus*) [*R.A.M.*, 33, p. 674]. BG–52–18 was highly resistant to races 1 and 3 but susceptible to 2 and BG–51–4 was susceptible to 1 and 2 and intermediate in reaction to 3. Race 2 attacked all the lines tested, though the intermediate reaction displayed by some of them indicated a type of resistance or tolerance.

Schmidt (T[rude]). **Starkes Auftreten der Sklerotienkrankheit der Tulpe im Frühjahr 1954.** [Extensive development of the sclerotial disease of Tulip in the spring of 1954.]—*Pflanzenarzt*, 7, 10, p. 4, 2 figs., 1954.

In connexion with the appearance of *Sclerotium tuliparum* on tulip bulbs in Austria [cf. *R.A.M.*, 29, p. 214], information on its symptomatology, etiology, and control is presented in popular terms. Soil decontamination may be effected by the incorporation of brassicol at 50 to 75 gm. per sq. m., while the bulbs should be immersed in 0·4 per cent. formalin or 0·5 per cent. of an [unspecified] fungicidal solution for periods of one to eight hours (the longer period if root development has not begun) or dusted with brassicol at 2·5 to 5 gm. per kg.

Haasis (F. A.). **Control of dry rot of Gladiolus corms in storage with fungicides applied after harvest.**—*Plant Dis. Reptr*, 38, 7, pp. 518–520, 1954. [Multilithed.]

Storage losses, due to *Stromatinia* [*Sclerotinia*] *gladioli*, in Picardy gladiolus [*R.A.M.*, 33, p. 83] were effectively reduced at the Vegetable Research Laboratory, near Wilmington, North Carolina, by immersing corms, shortly after harvest and cleaning, for five minutes in ceresan M (1 lb. per 100 gals. water). Subsequent plant and corm growth were not adversely affected.

Parmelee (J. A.). **Curvularia on Gladiolus in Canada.**—*Plant Dis. Reptr*, 38, 7, pp. 515–517, 7 figs., 1954. [Multilithed.]

In 1953 and 1954 a species of *Curvularia* [cf. *R.A.M.*, 33, p. 474], intermediate in spore size, shape, and septation between *C. trifolii* and *C. lunata*, was isolated from leaves and corms of Radiance gladioli grown in two localities near Montreal, Canada. On one farm the disease had been present on Radiance for the past ten years and in 1953 it attacked other varieties including Harry Hopkins, Spic and Span, Aotearoa, King Click, Pactolus, Lipstick, and Montpellier.

Scaramuzzi (G.). **Alterazioni delle piante di Garofano dovute ad Alternaria dianthi e A. dianthicola.** [Diseases of Carnation plants due to *Alternaria dianthi* and *A. dianthicola*.]—*Ann. Sper. agr.*, 7, 1, pp. 73–87, 3 figs., 1953. [English summary.]

The information in this paper on an infection of carnations in Italy by *Alternaria dianthi* and *A. dianthicola* [*R.A.M.*, 33, p. 675] has already been noticed from other sources [32, pp. 80, 561].

Lamberts (H.). **Resistance to mildew in yellow Lupins.**—*Euphytica*, 1, 3, pp. 199–200, 1 fig., 1952. [Dutch summary.]

Work is in progress at the Agricultural University, Wageningen, Holland, for finding varieties of yellow lupin [*Lupinus luteus*] resistant to [powdery] mildew (*Erysiphe*

polygoni). Wild resistant varieties from Portugal [*R.A.M.*, 18, p. 599] and Spain, known as WH 20 and WH 21, which showed no trace of the disease during a severe attack on other varieties, are being used in breeding experiments. To date, no resistant plants of sweet lupin have been obtained from crosses between resistant bitter and susceptible sweet individuals.

Andrew (W. D.) & Milligan (R. T.). **Different molybdenum requirements of Medics and Subterranean Clover on a red brown soil at Wagga, New South Wales.**—*J. Aust. Inst. agric. Sci.*, 20, 2, pp. 123–124, 1954.

In a field trial at Wagga, New South Wales, Bacchus Marsh subterranean clover [*Trifolium subterraneum*] and various species and strains of annual medicks (*Medicago* spp.) were sown on a red-brown earth with no free lime and a pH of 5·7 in the top 4 in. Though the subterranean clover grew well and Wimmera rye grass [*Lolium perenne*] growing with it seemed healthy and vigorous, and the subsequent wheat crop three years later also had a healthy appearance, the medicks rapidly lost vigour after the first year, and many of the plants died, apparently as a result of infection by *Ascochyta imperfecta* [C.M.I. map No. 263; cf. *R.A.M.*, 29, p. 567]. Both the Wimmera rye grass growing with the medick and the wheat following were yellow and unthrifty, apparently owing to an unsatisfactory build-up of soil nitrogen by the legume. On the other hand, where subterranean clover volunteered on the medick plots the clover leaves were green and healthy, though the admixed medick leaves were yellow.

Field observations and responses in pot culture tests indicated that the molybdenum requirement [cf. 33, p. 729] of medicks for active growth and nitrogen fixation differs from that of subterranean clover, and may partly explain the inability of medicks to flourish on certain acidic soils where subterranean clover grows readily.

Iljin (W. S.). **Microelementos en las plantas forrajeras.** [Trace elements in forage plants.]—*Agron. trop., Maracay*, 2, 2, pp. 91–112, 1952.

The author tabulates the results of experiments to determine the boron, copper, zinc, molybdenum, manganese, and iron contents of specific forage crops in Venezuela and summarizes the available information on each element with reference to the literature (133 titles).

Langdon (R. F. N.) & Champ (B. R.). **The insect vectors of Claviceps paspali in Queensland.**—*J. Aust. Inst. agric. Sci.*, 20, 2, pp. 115–118, 1954.

A search was made for the insect vector of *Claviceps paspali* on *Paspalum dilatatum* in south-eastern Queensland [*R.A.M.*, 33, p. 607] during the summer and autumn of 1951 and 1952. Hand and net collections in heavily infected stands of the grass showed that the green fly *Pyrellia caerulea* [loc. cit.] was by far the most abundant insect associated with infected plants. Conidia were found to be voided with the faeces with their viability unimpaired.

The vectors of the ergot fall into two groups: (*a*) those which carry inoculum only on the external parts of their bodies, and (*b*) those which ingest conidia. Group (*a*) includes chance visitors to *Paspalum dilatatum*, such as thrips and aphids moving about on an inflorescence. The second group includes a number of strong-flying insects, especially *Pyrellia caerulae*, with habits which would result in widespread dissemination of inoculum.

Soenen (A.). **Contribution à l'étude de la tavelure. Méthodes de comptage.** [Contribution to the study of scab. Methods of evaluation.]—*Phytiatrie-Phytopharm.*, 4 (*1952*), pp. 29–42, 1 pl., 1 graph, 1952. [Received 1954.]

The author holds that to assess the damage caused by apple scab (*Venturia*

inaequalis) by taking only the percentage of scabbed fruits at harvest [*R.A.M.*, 32, p. 488] is insufficient and that it is necessary to repeat disease counts throughout the development of the pathogen on both leaves [loc. cit.] and fruit, particularly at the close of primary (ascospore) infection, employing an adequate formula and taking a sufficient number of units, depending on the degree of infection, at each count. In order to obtain an accurate picture of infection the evaluation throughout a single plantation should, in theory, be made by a single person in one day, in view of the rapidity with which the disease spreads and the rate of multiplication of the lesions in 24 hours.

The author proposes the formula:

$$T = \frac{\sum (nv) \times 100}{5N}$$

where T is the degree of infection, $\sum$ the sum, n the number of leaves with a particular rating (v) measured on a scale of 0 (no lesions) to 5 (more than 20), and N the total number of leaves. To enable the counts to be made by one person six four-figure counting machines are secured to a board, three a side, which is strapped to the operator. Five are for each of the five values on the scale and the sixth for totalling them. Fruit scab is measured on a scale from 0 to 2 (lesions all over).

Certain problems arising from this method are discussed.

Smith (L. C.). **Concentrate airblast spray trials.**—*J. Dep. Agric. S. Aust.*, 58, 1, pp. 23–26, 2 figs., 1954.

In the control trials carried out in 1953–4 in South Australia against apple scab [*Venturia inaequalis*: see next abstract] on Rome Beauty no significant difference in the amount of fruit infection was observed between hand sprayed and Turbo-mist [cf. *R.A.M.*, 33, p. 91] sprayed trees. However, it is probable that the rates of Bordeaux mixture and lime-sulphur for the standard schedule recommended for hand-spraying could possibly be reduced when the Turbo-mist sprayer is used. A table gives the dilute spray strengths as recommended by the State Department of Agriculture, concentration increases, and the corresponding concentrate spray strengths shown by experience over the past three years to be suitable for local conditions. Emphasis is laid on the importance of the speed of travel, 1½ and 1 m.p.h. being recommended for the successful coverage of average and large trees, respectively. Operation and maintenance of the equipment are described.

Smith (L. C.). **Apple scab investigations, 1951–1954.**—*J. Dep. Agric. S. Aust.*, 58, 1, pp. 32–36, 3 figs., 5 graphs, 1954.

Further investigations on apple scab (*Venturia inaequalis*) in South Australia [*R.A.M.*, 33, p. 657 and preceding abstract] have shown that ascospore discharge is greatest in the wetter districts and may occur spasmodically with rains until March. The frequency of discharge, depending on the frequency of rain during that period, was greater during the very wet 1952–3 season than during the preceding and subsequent drier years. The results of the summer fungicidal tests indicate that 80 per cent. thiram (1½ lb. per 100 gals. plus ½ gal. white oil as a sticker) and PMF (phenyl mercury fixtan, 8 oz. per 100 gals.) are both safe for late cover applications and are effective against late infection. PMF can eradicate young scab infections if applied immediately after they occur. It is very important to protect both fruit and foliage during November and early December in the wetter districts, particularly during wet seasons. The amended recommendations for control [33, p. 91] include thiram as an alternative to lime-sulphur at petal fall and for cover sprays. Organic mercurials, however, may be used to clean up established infections or replace thiram for protective cover spraying.

Kirby (R. S.). **Effectiveness of antibiotics for Apple fire blight control under epidemic conditions in Pennsylvania.**—*Plant Dis. Reptr*, 38, 7, pp. 432–433, 1954. [Multilithed.]

In trials for the control of apple fire blight (*Erwinia amylovora*) [*R.A.M.*, 34, p. 40] in an orchard in Franklin county, Pennsylvania, two bloom sprays of agrimycin [22·2 per cent. streptomycin plus 2·2 per cent. terramycin] (9·34 oz. per 100 gals.), applied in the regular schedule, reduced the average number of infections per tree on Opalescent and Gravenstein to 0·92, compared with 88·5 for pheno-lead from petal fall to second cover and 106·5 for the regular schedule (which included 2 lb. captan) alone [cf. 33, p. 157]. Spread of infection down the spurs and into the branches was arrested in agrimycin-sprayed trees, though pronounced in those receiving the other treatments.

Govi (G.). **La 'maculatura fuligginosa' e le 'croste puntiformi' delle Mele.** [Sooty blotch and fly speck of Apples.]—*Ann. Sper. agr.*, 7, 1, pp. 339–345, 1 col. pl., 2 figs., 1953. [English summary.]

The author records the presence in Italy of sooty blotch (*Gloeodes pomigena*) [cf. *R.A.M.*, 13, p. 243 *et passim*] and fly speck (*Leptothyrium pomi*) [cf. 5, p. 699 *et passim*] of apple, briefly describes the symptoms of each, and recapitulates the control methods advocated in the literature against *G. pomigena*.

Mason (C. L.). **Fall spraying for control of bacterial spot of Peaches.** —*Arkans. Fm Res.*, 1, 3, p. 5, 1 fig., 1952.

Experiments carried out from 1948 to 1952 for the control of bacterial spot of peaches (*Xanthomonas pruni*) [*R.A.M.*, 32, p. 322] in Arkansas demonstrated the effectiveness of autumn sprays of copper sulphate (4 lb. per 100 gals. water) followed by lime water (6 lb. per 100 gals.) to prevent injury and defoliation.

Wright (W. R.), Smith (M. A.), & Ramsey (G. B.). **Diplodina rot of South Carolina Peaches.**—*Plant Dis. Reptr*, 38, 7, pp. 436–437, 2 figs., 1954. [Multilithed.]

A decay of Elberta peaches in a commercial shipment from South Carolina was found to be caused by *Diplodina persicae* [*R.A.M.*, 33, p. 732]. It is suggested that prompt precooling of the fruit and shipment under standard refrigeration should control the decay during transit.

Wilhelm (S.), Nyland (G.), & Charles (F.). **Verticillium wilt of sweet Cherry in California.**—*Plant Dis. Reptr*, 38, 7, p. 438, 1954. [Multilithed.]

In 1952 and 1953 a *Verticillium* wilt affected isolated sweet cherry trees [cf. *R.A.M.*, 33, p. 434] on *Prunus mahaleb* and *P. avium* understocks in the Davis, Santa Clara, and Stockton areas of California, where recent extensive plantings had been made, some on land previously cropped with tomatoes. *V. albo-atrum* was isolated from the discoloured wood of some of these trees and was experimentally pathogenic to tomato.

Sergeeva (Mme K. D.). Новые сорта Крыжовника. [New Gooseberry varieties.]—Природа [*Nature, Moscow*], 43, 9, pp. 100–102, 2 figs., 1954.

The gooseberry varieties Russky [Russian], Malahit, Pioneer, Plodorodnuy [Fruitbearing], Desert, Ruby, and Severnuy Vinograd [Northern Vineyard], developed at the Scientific Research Institute of Fruit-culture, Michurinsk, U.S.S.R., are resistant to *Sphaerotheca* [*mors-uvae*: *R.A.M.*, 33, p. 736] and bear large fruits.

Avent (K. L.). **Raising the standard of Strawberry plantings.**—*J. Dep. Agric. Vict.*, 52, 10, pp. 460–461, 3 figs., 1954.

To halt the progressive decline of strawberry plants in Victoria due to viruses, ncluding the crinkle leaf virus [strawberry crinkle virus: cf. *R.A.M.*, 30, p. 99], the

Department of Agriculture is commencing a certification scheme [29, p. 418] whereby only material grown from stocks of the highest standard, treated correctly to prevent infection, will be certified. These runners should be planted as far as possible from other strawberries and sprayed with 0·01 per cent. parathion.

This scheme should also afford protection against the root rot, believed to be of fungus origin, which has caused apparently normal plants to wilt and die during warm spring weather in recent years.

Fogliani (G.). **Ricerche sulla leptonecrosi dell'Olivo 2a. Sintomatologia dell' alterazione negli Olivi della zona del Garda.** [Studies on leptonecrosis of the Olive tree II. Symptomatology of the disease in Olive trees in the Garda district.]—Reprinted from *Olearia, 1952*, 11–12, 10 pp., 27 figs., 1 diag., 1952. [French, English, and German summaries.]

As a result of observations from 1950 to 1952 on the development of symptoms of leptonecrosis in olive trees on the shores of Lake Garda, northern Italy [cf. *R.A.M.*, 31, p. 246; 32, p. 423, and next abstract], the author describes and defines 23 manifestations; the frequency with which they occurred, from the top to the foot of the tree, is tabulated.

Sarejanni (J. A.) & Papaïoannou (A. J.). **La pathologie des mycoses à Macrophoma des Olives.** [The pathology of *Macrophoma* mycoses of Olives.]—*Ann. Inst. phytopath. Benaki*, 6, 2, pp. 37–50, 5 pl., 1952.

This paper is confined to a study of the pathology of an affection of olives in Greece associated with two fungi having a *Macrophoma* stage, namely, *M. dalmatica* [*R.A.M.*, 18, p. 10; 30, p. 235] and *Septoriella oleae* [18, p. 10]. There are three manifestations of the disease. One, the bird's eye spot stage, is well known. The second, a brown rot, occurs about mid-August when pycnidia and the punctures caused by *Dacus oleae* are visible. The third manifestation, very rarely seen, is a combination of the two preceding.

Experiments demonstrated that both fungi are wound parasites, forming slime spores which are liberated chiefly in humid conditions, but also in dry weather when they are carried by *Prolasioptera berlesiana*, a parasite of *D. oleae*. The insect probably picks up the spores from the soil on which mummified fruits have fallen, from leaves and limbs of olive trees, and from undetermined alternate hosts. Inoculations with *M. dalmatica* produced a severe brown rot with numerous, apparently equidistant pycnidia, on grapes, apples, pears, lemons, and oranges. Tomato and eggplant fruits exhibited rot only. Pycnidia were also observed on growing apricot branches. Olives attached to the tree inoculated in August developed dry spot symptoms; detached fruits inoculated at the end of October developed brown rot. This varied response is probably due to the amount of water in the tree.

At present control appears to lie in avoiding injuries through which the fungi can enter by destroying the insects making them.

Malaguti (G.) & Pontis Videla (R. E.). **La podredumbre de las raices del Aguacate (Persea americana Mill.) en Venezuela.** [Root rot of Avocado (*Persea americana* Mill.) in Venezuela.]—*Agron. trop. Maracay*, 2, 2, pp. 77–82, 1 fig., 1952. [English summary. Received 1953.]

Phytophthora cinnamomi is reported for the first time from Venezuela as the agent of avocado root rot [*R.A.M.*, 33, p. 738] in Sanare and El Tocuyo (Lara State), Mene Grande and Cabimas (Zulia), Cumanacoa and El Pilar (Sucre), Río Tuy and Barlovento (Miranda), and San Casimiro, San Sebastián, Ocumare de la Costa, Choroní, and Chuao (Aragua), particularly under humid and misty condi-

tions and on clay or poorly drained soils. Over 60 per cent. of the trees died in a plantation near El Pilar.

Both forms of the disease were observed [cf. 27, p. 327], the rapid wilting and death with development of cankers in the root collar region and, more often, the slow decline in which the main roots are seldom affected.

VERMA (G. S.). **The formation of lesions by gases on Mango fruits.**—*J. Indian bot. Soc.*, 31, 4, pp. 316–341, 4 figs., 1952.

In further work at the Department of Botany, Lucknow University, India, on the lesions induced on growing and picked mango fruits by sulphur dioxide [*R.A.M.* 20, p. 313] and ethylene, singly and together, it was noted that prolonged exposure to very low concentrations of the gases produced no effect. With a concentration of 4:10,000 sulphur dioxide the fruits shrank at the tip and the skin turned brown; young fruits shrivelled more evenly and eventually dropped off. Ethylene at 1:10,000 induced ripening, while slightly greater concentrations produced brown lesions round the lenticels, which increased in size with increasing doses. A mixture of the two gases caused dark brown lesions; low concentrations under laboratory conditions induced ripening.

SOENEN (A.). **Les énigmes de la nomenclature en phytopharmacie.** [Enigmas of nomenclature in phytopharmacy.]—*Phytiatrie-Phytopharm.*, 4 (*1952*), pp. 43–46, 1952. [Received 1954.]

The author discusses the anomalies and confusions arising because of the varied nomenclature of chemicals used in plant protection and urges research workers, in publishing their results, to specify the precise nature and trade name of the product employed.

MACLINN (W. A.). **Taste panel studies on fungicides.**—*Agric. Chemic.*, 8, 3, pp. 50–52, 145, 1 fig., 1953.

In preliminary discrimination tests conducted during 1951 in the Food Technology Department, Rutgers University, New Brunswick, New Jersey, a taste panel was able to detect differences in the flavour of tomatoes treated with nine different fungicides [cf. *R.A.M.*, 32, p. 635].

BALDACCI (E.). **Anticrittogamici, sistemici, antibiotici nella lotta fitopatologica.** [Fungicides, systemic compounds, and antibiotics in the control of plant diseases.] —Reprinted from *Boll. Agric., Milano*, 10–11, 22 pp., 1953.

In this paper, read at a conference on the subject held by the Agrarian Society of Lombardy on 14th February, 1953, the author discusses the mode of action of fungicides for the control of specified plant diseases and describes the composition of some newer fungicides, and the history and use of systemic compounds [*R.A.M.*, 32, p. 437] and antibiotics [34, p. 49], with specific examples, and the production of antibiotics by soil organisms [loc. cit.].

HUBBELL (D. S.). **Desirable physical and chemical properties claimed for this new copper fungicide.**—*Agric. Chemic.* 8, 6, pp. 54–56, 159, 160, 1 fig., 1 graph, 3 diags., 1953.

A description is given of the physical, chemical, and fungicidal properties of the new Robertson fungicide [Robertson copper: *R.A.M.*, 33, p. 469], which has a core of metallic copper with a covering of cuprous oxide. The small particles are free flowing, easily wetted, remain in suspension without settling, and have good adhesive powers. Tests on young bean plants [*Phaseolus vulgaris*] indicate that this fungicide is no more toxic than other copper compounds.

In a dry year (1952) in five out of nine field tests at agricultural experiment

stations in the United States [against unspecified diseases] on potatoes and tomatoes, the yields following Robertson copper (2–100) were higher than those of the untreated or other fungicide treatments. In wet years (1950 and 1951) results were best with a mixture of Robertson copper and ziram, both at 2–100.

Kowalik (R.) & Czerwińska (Mme E.). **Grzybobójcze działanie czterochloro-p-benzochinonu i 2,3-dwuchloro-1,4-naftochinonu.** [The fungicidal activity of tetrachloro-*p*-benzoquinone and 2,3-dichloro-1,4-naphthaquinone.]—*Acta microbiol. polonica*, 2, 2–3, pp. 111–120, 8 graphs, 1953. [English and Russian summaries.]

Tested by Vincent's method [*R.A.M.*, 27, p. 142] at the Institute of Toxicology, Warsaw, Poland, tetrachloro-*p*-benzoquinone and 2,3-dichloro-1,4-naphthaquinone completely inhibited the growth of *Alternaria solani* at 0·125 and 0·001 per cent., respectively, *Cladosporium herbarum* at 0·125 and 0·004, *Fusarium* sp. at 0·125 and 0·00025, *Rhizoctonia* [*Corticium*] *solani* at 0·25 and 0·004, and *Colletotrichum lindemuthianum* at 0·03 and 0·001.

Barrau (J.). **Research in Queensland on tropical plant and animal industries.**—*Tech. Pap. sth. Pacif. Comm.* 43, iii+72 pp., 24 figs., 1 map, 1953. [Mimeoprinted.]

Chapter II (pp. 5–11) of this paper describes the organization of agricultural research in the tropical coastal area of Queensland, Australia. Chapter III (pp. 12–41) deals with the research on crops, IV (pp. 42–54) with pastures and fodder, and V (pp. 55–58) with plant pests and diseases, and VI (pp. 59–65) with weed control. In chapter V an outline is given of the research programme in operation.

Czerwińska (Mme E.), Sadurska (Mme I.), & Kozłowska (Mme D.). **Promieniowce niszczace papier zabytkowy.** [Actinomycetes damaging old papers.] —*Acta microbiol. polonica*, 2, 2–3, pp. 160-164, 1953. [Russian and English summaries.]

Thirteen isolates of actinomycetes were obtained from old documents and manuscripts at Warsaw University, Poland [*R.A.M.*, 32, p. 583]. Peptone, amino acids, and sodium nitrate proved to be the best nitrogen sources for these strains, though ammonium dihydrogen phosphate alone was suitable for some of them. The optimum pH lay between 4 and 6. Mannitol, saccharose, glucose, glycerol, cellulose, and starch appeared to be good carbon sources, the best growth occurring in media containing 0·25 per cent. glucose. All isolates produced enzyme Cx. Salicylanilide at 0·005 per cent., ziram at 0·6 per cent., *p*-chloro-*m*-cresol at 0·005 per cent., and ethylene oxide in vacuum camera were lethal to all strains.

Waterhouse (Grace M.) & Blackwell (Elizabeth M.). **Key to the species of Phytophthora recorded in the British Isles.** *Mycol. Pap. Commonw. Mycol. Inst.* 57, 9 pp., 1954. 3*s*.

This key to the identification of British species of *Phytophthora*, intended primarily for the use of plant pathologists, is preceded by notes on cultural methods and followed by brief descriptions of further diagnostic features of the 16 recorded species and varieties.

Müller (K. O.), Mackay (J. H. E.), & Friend (Janet N.). **Effect of streptomycin on the host-pathogen relationship of a fungal pathogen.**—*Nature, Lond.*, 174, 4436, pp. 878–879, 1954.

At the Division of Plant Industry, Canberra, the roots of 35-day-old potato and tomato plants were exposed for a week in nutrient solutions containing various concentrations of streptomycin calcium chloride [cf. *R.A.M.*, 33, pp. 315, 369;

34, p. 49]. Detached leaves were inoculated with a zoospore suspension of *Phytophthora infestans* applied in filter paper disks and incubated at 20° C. in a moist chamber. In one experiment whole plants were sprayed with the suspension. The antibiotic conferred marked protection at concentrations which did not affect the vegetative development of the plants; 4 μgm. streptomycin per ml. nutrient solution completely checked the disease in tomato. The spread of the fungus was restricted after contact with the host plasm, in contrast to the diffuse development in the untreated plants; the parasitized host cell died and the surrounding tissue often became chlorotic. The concentrations of antibiotic supplied and those in extracts of treated plants had no significant effect on zoospore development or germination in *P. infestans*.

Higher concentrations were required to check the development of the fungus in the surfaces of cut tubers, sporulation being depressed slightly at 60 μgm. per ml. and completely inhibited at 200 μgm. per ml. It appears that the antibiotic is firmly held by the host cell, since there is little movement to tissue developed after the plant is removed from treated to normal solutions. Many treated potato plants were severely attacked by powdery mildew (*Erysiphe solani*) [*E. cichoracearum*], even those receiving a concentration of 100 μgm. per ml. streptomycin.

English (A. R.) & VanHalsema (G.). **A note on the delay in the emergence of resistant Xanthomonas and Erwinia strains by the use of streptomycin plus terramycin combinations.** *Plant Dis. Reptr*, 38, 7, pp. 429–431, 2 graphs, 1954. [Multilithed.]

In vitro studies at the Bacteriology Laboratory of Chas. Pfizer and Co., Inc., Brooklyn, New York, showed that a combination of streptomycin and 1 or 10 per cent. terramycin was effective in delaying the rate of emergence of streptomycin-resistant strains of *Erwinia amylovora* [cf. *R.A.M.*, 33, p. 369] and *Xanthomonas vesicatoria* [cf. 33, p. 330] compared with streptomycin alone, when the bacteria were exposed to progressively increasing concentrations of the antibiotics.

Dirks (B. M.). **The properties of some fungal lipases and their role in grain deterioration.**—*Diss. Abstr.*, 14, 3, pp. 458–459, 1954.

Investigations at the University of Minnesota of the lipase activity of wheat germ and the moulds *Aspergillus candidus* and a *Penicillium* sp. [*R.A.M.*, 30, p. 58] indicated that the appearance of fat acidity in stored grain was apparently due chiefly to the activity of fungal lipase, although a substance inhibitory to this activity was present in water extracts of the grain. Lipolytic activity in mouldy wheat was ten times that in a non-mouldy sample.

Démétriadès (S. D.). **Études sur la biologie du Sclerotinia sclerotiorum (Lib.) Massee. II. L'utilisation de diverses sources de carbone.** [Studies on the biology of *Sclerotinia sclerotiorum* (Lib.) Massee. II. The utilization of various carbon sources.] *Ann. Inst. phytopath. Benaki*, 6, 2, pp. 51–59, 3 graphs, 1952.

In further studies in this series [cf. *R.A.M.*, 32, p. 272] *Sclerotinia sclerotiorum* in Richards's solution utilized glucose, fructose, saccharose, lactose, and soluble starch equally efficiently for the production of dry matter and glucose, fructose, galactose, saccharose, lactose, dextrin, and glycogen for sclerotia. The toxicity of the culture filtrates to young eggplants in the six-leaf stage was considerably reduced when mannose or soluble starch was the carbon source.

Forti (G.). **'Florida test' e 'Sicilia test'. Le virosi della Patata.** [The 'Florida test' and 'Sicily test'. Virus diseases of the Potato.] Reprinted from *G. Agric.*, *1953*, 2, 8 pp., 5 figs., 1953.

This method of testing seed potato crops for the presence of virus diseases has already been noticed from another source [*R.A.M.*, 32, p. 690].

Mastenbroek (C.). **Investigations into the inheritance of the immunity from Phytophthora infestans De B. of Solanum demissum Lindl.**—*Euphytica*, 1, 3, pp. 187–198, 1 fig., 1952. [Dutch summary.]

In work at the Plant Breeding Station Centraal Bureau, Hoofdoorp, Holland, nine different physiologic races of *Phytophthora infestans* [*R.A.M.*, 33, p. 251] have been differentiated. There is an overlapping of the spectra of the races, and in consequence immunity in potatoes from races N (Netherlands) 8 and N9 includes immunity from the other seven. Genetical experiments have indicated the presence of three genes (R_7, R_8, R_9), with a possible fourth, all dominant allelomorphs of independent genes, which are responsible for immunity.

Keller (E. R.). **Phytophthora-Knollenfäule oder Braunfäule der Kartoffeln.** [*Phytophthora* tuber rot or brown rot of Potatoes.]—*Mitt. schweiz. Landw.*, 2, 9, pp. 154–156, 1 fig., 1954.

This is a summary of information, mostly well known, on various aspects of potato blight (*Phytophthora infestans*) in Switzerland [*R.A.M.*, 33, p. 316]. Dinitrocresol preparations, such as EK 54 (1·5 per cent.) or tufan (3 per cent.), may be applied as haulm-killers at harvesting.

Folsom (D.), Roach (H. Q.), Wiant (J. S.), & Kaufman (J.). **Effect of storage and railroad transit on Potato diseases, injuries, and shrinkage.**—*Bull. Me agric. Exp. Sta.* 507, 28 pp., 1 fig., 1952.

In shipments of potatoes [*R.A.M.*, 30, p. 187] from north-eastern Maine to New York City in refrigerator cars (temperature average 49° F.) from 1947 to 1949, tubers with blight (*Phytophthora infestans*) [33, pp. 686, 752] lost more weight than healthy ones, and in these samples *Fusarium* rot [*Fusarium* spp.: 33, p. 444] and [unspecified] bacterial soft rot [loc. cit.; 33, p. 558] were more severe. Ring rot (*Corynebacterium sepedonicum*) increased in prevalence and severity, while net necrosis due to leaf roll virus and virus stem-end browning increased in severity. Larger tubers showed a greater percentage of surface area covered by early blight (*Alternaria solani*) [33, p. 624 and next abstract] lesions and more severe and prevalent low-temperature mahogany browning. Washed potatoes showed no change in transit over a test period of seven days, but on stocks with bacterial soft rot, scrubbed with rubber brushes and sawdust, there was an increase of lesions and rot, though early blight was reduced.

Samples of 100 lb. gave more significant differences in net necrosis than 50 or 25 lb. lots.

Cook (A. A.). **A foliage disease of Potato induced by Chaetomium species.**—*Plant Dis. Reptr*, 38, 6, pp. 403–404, 1 fig., 1954. [Multilithed.]

In 1951–2 black necrotic lesions, similar to those of potato early blight (*Alternaria solani*) [see preceding abstract] except for the absence of concentric ridges, were observed on the leaves of several Cherokee and Bliss Triumph potato plants in a greenhouse at South Dakota Agricultural Experiment Station, State College Station. *Chaetomium aureum*, *C. globosum*, *C. torulosum*, and *C. trilaterale*, isolated from the diseased leaves, and *C. tortile*, previously obtained from tubers, produced limited necrotic lesions and some chlorosis when inoculated on wounded leaves. Culture filtrates of these fungi were toxic to excised potato shoots, causing wilting, interveinal chlorosis and necrosis, and marginal burning. Symptoms comparable with those on plants from which the original isolations were made were not, however, obtained.

Castano (J. J.). **Roya de la Papa.** [Potato rust.]—*Agricultura trop.*, 8, 9, pp. 47–48, 2 figs., 1952.

Potato rust (*Puccinia pittieriana*) recently occurred in epiphytotic proportions

in some plantings in the Letras area over 3,000 m. above sea-level between the departments of Caldas and Tolima, Colombia [*R.A.M.*, 29, p. 528]. Hitherto the disease was believed to be of little economic importance.

CORDNER (H. B.). **Allgold, a new high-vitamin, high-yielding Sweet Potato.** —*Bull. Okla. agric. Exp. Sta.* B–388, 11 pp., 3 figs., 1952.

Allgold [*R.A.M.*, 33, p. 111], a 'yam-type' sweet potato, was developed and released by the Oklahoma Agricultural Experiment Station. In resistance tests from 1948 to 1952 it showed considerable tolerance of and generally remained free from stem rot [*Fusarium bulbigenum* var. *batatas*: 32, p. 505] and its roots were relatively free from scurf [*Monilochaetes infuscans*: C.M.I. map No. 246], black rot [*Ceratocystis fimbriata*: *R.A.M.*, 31, p. 101], and soil rot [*Actinomyces ipomoea*: 32, p. 505], though the actual degree of resistance or susceptibility to these diseases is not yet determined.

Memoria de la primera reunión de Papa realizada en la Estación Experimental de Balcarce, 23 y 24 de Octubre de 1952. [Proceedings of the First Potato Conference held at the Balcarce Experimental Station, on 23rd and 24th October, 1952.]—77 pp., 1952. [Received 1954.]

Section IV (pp. 43–70) of this report from Argentina deals with pests and diseases of potatoes and includes the following papers.

A. V. CALDERONI, M. V. FERNÁNDEZ VALIELA, and M. BAKARCIC (pp. 43–50) state that in recent years, and particularly in 1948–9, serious losses have been sustained in the Carrera Valley of Mendoza, Salta, and the south-east of Buenos Aires Province from a wilt due to *Fusarium solani* var. *eumartii* [*R.A.M.*, 31, p. 628; 32, p. 172]. The fungus was isolated from the plant rootlets and less readily from the stolons and tubers. Tuber symptoms were chiefly due to toxin production. Infection was greatest in fields grown repeatedly with susceptible varieties, and promoted by climatic conditions favourable to plant growth. The disease was transmitted by infected tubers; disinfection with 1·5 per 1,000 mercuric chloride was ineffective. Tubers stacked in heaps continued to degenerate. In varietal trials Sequoia, Sebago, and Huinkul M.A.G. were the most susceptible (92·8, 92·8, and 77·7 per cent. infection, respectively), White Rose (39·2) was moderately resistant, and Katahdin (6·6) and Pontiac (6·8) were resistant. Control lies in planting resistant varieties; if susceptible ones are used the tubers should be undamaged and the fields not previously planted with potatoes for some years.

M. V. FERNÁNDEZ VALIELA (pp. 51–59) states that from co-operative studies between the Balcarce Experiment Station and the Delta Laboratory for Phytopathology degeneration of Katahdin potatoes in south-east Buenos Aires [30, p. 579] would appear to be caused primarily by the leaf roll virus [30, p. 358].

The same author (p. 61) considers that although *Lycopersicon* virus 3 [tomato spotted wilt virus] is very common on potatoes in south-east Buenos Aires [loc. cit.], particularly in years of little rainfall and towards the end of the growth period, sometimes affecting over 50 per cent. of the crop, tuber transmission is insignificant, particularly in Katahdin, and since the virus does not contribute to degeneration it need not be considered in the regulations governing seed potato certification.

On pp. 63–64 he discusses the reaction of Katahdin to the most common viruses in Argentina. It is susceptible to the necrotic strain of virus X, tomato spotted wilt, leaf roll, and spindle tuber [33, p. 685] (almost certainly present) resistant to rugose mosaic (virus X + virus Y) and to Y alone, and field immune from crinkle (virus X + virus A).

According to A. V. CALDERONI and C. J. INDUNI (pp. 67–70) potato scab (*Streptomyces* [*Actinomyces*] *scabies*) is moderately severe on certain types of soils

in the south-east of Buenos Aires, its effects being felt chiefly in the seed-potato industry. Of 127 varieties and clones from various sources tested for their reaction to the disease over a period of three years at the Balcarce Experiment Station, those resistant [33, p. 555] were Johansen and Jubel (Germany), Seneca (United States), and King George (Great Britain). The 13 moderately resistant varieties included the indigenous Runa.

D. R. Pasquale (pp. 71–73) recommends restoring the certification of the variety Huinkul M.A. [32, p. 172] as its yields are so much higher than those of other varieties (about 40 per cent. more than Katahdin).

Akai (S.), & Asada (Y.). **Studies on Helminthosporium blight of Rice plants. I. On the resistance of varieties of Rice plants to Helminthosporium blight.**—*Forsch. PflKr., Kyoto*, 5, 1, pp. 1–14, 1 fig., 1954.

A study was made at the Laboratory of Phytopathology, Kyoto University, Japan, of the morphological and physiological characters of three rice varieties connected with resistance to *Cochliobolus* [*Ophiobolus*] *miyabeanus* [*R.A.M.*, 33, pp. 560, 625; 34, p. 60, and next abstract]. The most resistant variety, Kameji, possessed the thickest and toughest epidermal cell wall and the highest adult and seedling leaf resistance. The susceptible variety, Magatama, was least in these respects, with Norin No. 6 intermediate. Magatama had a higher nitrogen and sugar content than Kameji. Expressed sap from Kameji inhibited the elongation of *O. miyabeanus* germ-tubes but not the germination of the conidia. When leaves were narcotized with chloroform the order of resistance of mature plants was unaffected, but seedlings of all three varieties were attacked equally. Kameji had fewer large leaf spots and more small spots than Magatama, in which lesions spread three times as rapidly.

Ueyama (A.). **Untersuchungen über die 'Gomohagare'—Krankheit der Reispflanze. IV. Über den Einfluss des Phenylquecksilberazetats auf Cochliobolus (Ophiobolus) miyabeanus.** [Investigations on the 'Gomahagare'-disease of the Rice plant. IV. On the effect of phenyl mercury acetate on *Cochliobolus* (*Ophiobolus*) *miyabeanus*.]—*Forsch. PflKr., Kyoto*, 5, 1, pp. 22–26, 1954. [Japanese, with German summary.]

The minimum concentration of phenyl mercury acetate for inhibiting the germination of conidia of *Ophiobolus miyabeanus* [see preceding abstract] in 1 per cent. potato dextrose agar at 28° C. was at the rate of 0·242 mg. mercury per l., or $1{\cdot}96 \times 10^{-5}$ per cent. Increasing the concentration reduced the size of conidia formed in 2·5 per cent. Richards's glucose solution but in soil the size was normal.

Padmanabhan (S. Y.), Ganguly (D.), & Balakrishnan (M. S.). **Helminthosporium disease of Rice.—II. Source and development of seedling infection.**—*Indian Phytopath.*, 6 (*1953*), 2, pp. 96–105, 1954.

A further study in this series [*R.A.M.*, 28, p. 641] was concerned with the viability of the rice seedling blight pathogen (*Cochliobolus* [*Ophiobolus*] *miyabeanus*) in India [33, p. 625] during the period between the end of one growing season (December) and the beginning of the next (June to July) and its pathogenicity under the conditions prevailing during the sowing season.

The fungus remained viable throughout the test period in culture (in sterilized, inoculated soil only), after which it caused 30 per cent. seedling blight in June, and in infected leaves stored dry in paper bags; from April to July it retained its vitality in the seeds of five varieties stored at relative humidities below 90 per cent. It could not be isolated after March from stubble in the field, nor after April from stubble stored in the laboratory. Seed-borne infection appeared, therefore, to be the only possibility but this was precluded since seedling infection developed in

noculated soil only at temperatures of or below 26° C., whereas in India the soil emperature at sowing time exceeds 30°.

In aeroscope studies conidia of *O. miyabeanus* were trapped on greased slides xposed over rice fields from April to July; it seems, therefore, that they are esponsible, as a source of secondary infection, for perpetuating the disease from eason to season. The origin of these conidia is being studied.

Kondo (Y.). **Physiological studies on cool-weather resistance of Rice varieties.**—*Bull. nat. Inst. agric. Sci., Tokyo*, Ser. D, *1952*, 3, pp. 113–228, 1 diag., 119 graphs, 1952. [Japanese, with English summary.]

Experiments carried out from 1938 to 1943 at the Ou Experiment Farm, Akita refecture, Japan, using three varieties of rice, demonstrated differences between hem in ability to withstand low temperatures. Damage was greatest at 17° C. vhile the differentiation of reproductive cells was taking place, causing a degree f sterility depending on the variety. Late sowing of rice encouraged damage by last [*Piricularia oryzae*: *R.A.M.*, 32, p. 643 and next abstract], to which there vere also varietal differences in susceptibility. Resistance of rice varieties to low emperature injury and to *P. oryzae* appears to reside in different genetic factors, ut it should be possible to breed varieties resistant to both.

Hashioka (Y.). **Annual and local variation of the varietal resistance of Rice to the blast disease. A criticism of the stability of varietal resistance based upon the field experiments in Taiwan.**– *J. agric. Res. Taiwan*, 3, 3, pp. 10–25, 1 fig., 1952. [Japanese summary.]

Tests on the resistance of eight varieties of rice to blast disease [*Piricularia ryzae*: *R.A.M.*, 30, p. 190 and preceding abstract] were repeated for five con- ecutive years, 1934–8, at seven different localities between 25° N. and 22° N. in ormosa. Variations in varietal resistance were due to low temperatures [loc. cit.], xcessive nitrogen supply, shortening of day length, and wet weather, all of which avoured the development of blast, but they were on the whole restricted.

In the first three years Taichung 65, Tainun 18, and Chia I Woan (late) 2 were he most resistant; in the next two years when varieties with greater resistance vere tested Taichung 114 and Kao Hsiun 10 headed the list, with Taichung 65 in he moderately resistant group with Taipei 6.

There are physiologic races of *P. oryzae* with differing pathogenicity, further omplicating any study of resistance. Owing to improvements in plant breeding, ach year the varieties of rice used in Japan possess a greater degree of disease esistance than formerly.

Chattopadhyay (S. B.) & Gupta (C. D.). **Contribution to knowledge of Indian Aspergilli.**—*Indian Phytopath.*, 6 (*1953*), 2, pp. 92–95, 3 figs., 1954.

Detailed descriptions are given of *Aspergillus awamari*, *A. clavatus*, and *A. violaceo-fuscus*, isolated from the soil of paddy rice fields at the State Agricultural arm, Chinsurah, West Bengal; this brings the total of recognized species of *Aspergillus* in India [*R.A.M.*, 28, p. 644] to 27.

Kandiah (S.) & Rodrigo (D. M.). **Evidence of magnesium deficiency in Ceylon soils.**—*Trop. Agriculturist*, 110, 1, pp. 21–24, 1954.

Investigations into magnesium deficiency in Ceylon soils showed that cacao eaves presenting a 'sickle leaf' condition [*R.A.M.*, 32, p. 548] had a much higher otassium content [loc. cit.] and less magnesium than normal leaves. Cacao trees n soils derived from dolomitic limestone were unaffected, whereas the condition vas severe on two estates where this mineral was absent. Treatment of the trees n one of these estates with dolomitic limestone markedly improved their general ondition and reduced the number of sickle leaves.

Almost all the Tahiti seedless limes planted at the Fruit Station, Helbodde, were chlorotic and the affected leaves, which dropped off prematurely, were deficient in lime and magnesium [cf. 32, p. 670; 34, p. 33]. An application of 7 lb. of dolomitic limestone per tree was made on 23rd November, 1951, and one of 4 lb. of magnesium sulphate on 22nd October, 1952. All the trees developed a flourishing condition and began to fruit again after five years' failure.

Guava plants seven to eight years old, growing at Meerahawatte, were affected by a rosette condition in which the leaves turned purple, the veins alone remaining green; 7 lb. of dolomitic limestone per tree induced a striking improvement, the leaves turning green again.

Sorghum and maize leaves which became more and more purplish were also found to be deficient in magnesium.

HOFFMAN (I. C.). **New horticultural greenhouse utilizes advanced ideas in soil steaming.**—*Fm Home Res.*, 37, 277, pp. 54–55, 8 figs., 1952.

A newly designed soil steaming system [*R.A.M.*, 31, p. 458; 33, p. 62] recently installed in the new horticultural greenhouses at Ohio Agricultural Experiment Station has the following new features. The beds, or separate compartments of them, are heated independently by means of a header and sectional tile pipes. The header is a 1½ in. pipe 9½ ft. long with seven lines of 3-in. pipe for each 10 ft. bed. The expansion chamber on each pipe consists of a 6-in. length of 3-in. pipe fitted into one end of a standard 4-in. and a regular 3-in. in the other. This assembly allows enough steam to accumulate at the header ends to sterilize the soil properly and prevents the closing of the joints by expansion so tightly that the steam cannot escape into the soil. The beds are covered with canvas, weighted at the edges with boards, and the pressure is allowed to build up until the canvas floats above the soil. The best results were obtained by warming the pipes at 10 lb. pressure for ten minutes, heating the soil to 180° to 200° F. at 20 lb. for 1½ hours, and holding at 2 to 3 lb. for 4 hours before shutting off. The cover should be removed as soon as possible after this.

SUNDARAM (N. V.). **Thread blight of Ginger.**—*Indian Phytopath.*, 6 (*1953*), 2, pp. 80–85, 1 pl., 1954.

In August, 1951, thread blight was observed on the leaf blades of ginger plants at the Agricultural Research Station, Pattambi, Malabar. Small, watersoaked lesions appeared on the margins or other parts of the leaves, causing them to wilt or fall off. Fine hyphal threads spread over the infected parts and small brown sclerotia were sometimes present on the lower surface. The infected portions turned white and papery on drying. The disease spread rapidly in wet weather and was limited by low relative humidity. The causal fungus closely resembles *Pellicularia filamentosa* [*Corticium solani*], particularly in its production of banded leaf blight of arrowroot [*R.A.M.*, 29, p. 194]. In pathogenicity experiments besides arrowroot (*Maranta arundinacea*), leaves of *Canna indica*, cotton, groundnut, banana, sweet orange, *Setaria italica*, and barley were also infected.

Recommended control measures based on experiments at Pattambi include protective spraying before heavy rain with 5–5–50 Bordeaux mixture, taking care to cover both leaf surfaces.

CHEVAUGEON (J.). **Phyllosticta derridis Hennings. Taches foliaires du Derris.** [*Phyllosticta derridis* Hennings. Leaf spot of *Derris*.]—*Rev. Mycol.*, 18, *Suppl. colon.* 2, Fiche 11, 4 pp., 6 figs., 1953. [Received September, 1954.]

An account is given of the salient features of *Phyllosticta derridis* on *Derris* spp. [*R.A.M.*, 20, p. 226], the main points dealt with including geographical distribu-

tion, hosts, symptoms, penetration and transmission, morphological, cultural, and biological characters, and control.

COURTICE (N.). **The eradication of downy mildew in the Bundaberg area.**—*Cane Gr. quart. Bull.*, 16, 1, pp. 22–24, 1952.

It is reported that sugar-cane downy mildew [*Sclerospora sacchari*: *R.A.M.*, 31, p. 352; 33, p. 51] has been eradicated from the Bundaberg area in Queensland. Since 1946 the disease has been steadily decreasing, parallel with the reduction in acreage of the susceptible P.O.J. 2878 and the introduction of the resistant C.P. 29–116. No stools with downy mildew have been seen since March, 1950.

STEINDL (D. R. L.) & SMITH (N. M.). **Sclerospora disease.**—*Cane Gr. quart. Bull.*, 16, 1, pp. 7–9, 2 figs., 1952.

Most of this information on the new *Sclerospora* disease of sugar-cane in Australia [*S.* ? *macrospora*] has already been noticed from other sources [*R.A.M.*, 33, p. 51]. The disease appears to be dependent on water for dissemination. Most varieties seem to be susceptible, though the degree of susceptibility of each has not yet been determined.

The fungus has recently been found attacking wild sorghum (*Sorghum verticilliflorum*) in the Moreton area.

HUGHES (C. G.). **Testing Sugar-Cane varieties for resistance to leaf-scald disease.**—*Cane Gr. quart. Bull.*, 16, 1, pp. 12–15, 2 figs., 1952.

This is an account of the tests carried out in Queensland to detect varieties of sugar-cane resistant to leaf scald [*Xanthomonas albilineans*: *R.A.M.*, 31, p. 352; 33, p. 52]. Included among the varieties highly resistant both in trials and in commercial fields and which can be grown in the presence of the disease without suitable precautions are Pindar [32, p. 101], P.O.J.2725, Q.50, Q.813, and Vesta; intermediate in reaction are Pompey [5, pp. 188, 328] and P.O.J.2714 [10, p. 339].

ORIAN (G.). **Fiji disease of Sugar Cane in Madagascar.—Report on a mission by G. Orian, Plant Pathologist, Department of Agriculture, Mauritius.**—17 pp., 2 pl., 4 maps, 1954. [Mimeographed.]

Following the official notification to the Government of Mauritius in May, 1954, of the detection of Fiji disease of sugar-cane along the east coast of Madagascar, the author visited the affected area from 20th June to 10th July. Two centres of very severe infection were found in the Brickaville district and one in the Fenerive section, as well as small, isolated foci in the same regions and in the Tamatave area. From these observations it is concluded that the disease has been present on the island in a latent state for several years, and certainly before 1950, the earliest date assigned, in a preliminary survey, for its introduction. Infection is now spreading rapidly on the highly susceptible and widely cultivated M. 134/32 variety, and control operations are complicated by the fact that no cultural methods are practised in the small and scattered fields (covering a total area of some 200 ha.) allotted to the production of 'betsabetsa' (juice expressed and sold locally) during the 15 or 20 years allowed for the growth of the canes after planting. Some recommendations are made for the protection of Mauritius from the disease, which could reach that naturally quarantined island only by the illicit importation of contaminated cuttings or the accidental introduction of viruliferous insects.

Among other observations made during the survey of Madagascar may be mentioned the presence of gumming disease of sugar-cane [*Xanthomonas vasculorum*: C.M.I. map No. 3] and maize stripe virus, with its leafhopper vector, *Peregrinus maidis*, all new records for the island. *Clitocybe tabescens* is the agent of

a virulent root rot of *Albizzia*, coffee, cacao, and other trees [cf. *R.A.M.*, 27, p. 279 *et passim*].

Arx (J. A. v.) & Müller (E.). **Die Gattungen der amerosporen Pyrenomyceten.** [The genera of amerosporous Pyrenomycetes.]—*Beitr. Kryptogamenfl. Schweiz*, 11, 1, 434 pp., 119 figs., 1954.

This monograph covers the amerosporous genera of the Dothiorales, Phacidiales, Sphaeriales, Diaporthales, and Coronophoraceae. For each group dichotomous keys are given to the families and to the genera; for each genus the type species and synonyms are cited, together with a full description; and for each species synonyms, host or substratum, and a full description are supplied, followed by notes on the systematics. Three new genera, three new species, and many new combinations are made. There are host, generic, and species indexes, and a bibliography of nearly 250 titles.

Phaeostoma n.gen. (syn. *Ceratostoma* auct. non Fr.) [cf. *R.A.M.*, 20, p. 404] has a dark, leathery fruit body with a dark, elongated neck on an almost crust-like stroma. It is erected to include *P.* (*C.*) *vitis* n.comb. and *P.* (*C.*) *juniperina* n.comb.

The list of synonyms of *Glomerella cingulata* extends over 2½ pages and includes *Guignardia baccae*, *Glomerella glycines* (large-spored form) [33, p. 637], *G. gossypii*, *G. psidii*, and *Guignardia theae*. *Physalospora tucumanensis* is transferred as *Glomerella tucumanensis* n.comb.

Schmitt (J. A.). **The host specialization and morphology of the powdery mildew, Erysiphe cichoracearum DC. ex Mérat, from Zinnia, Phlox, and cucurbits.** – *Diss. Abstr.*, 14, 4, p. 587, 1954.

At the University of Michigan, *Erysiphe cichoracearum* from zinnia [*R.A.M.*, 25, p. 560], inoculated by a dusting technique to seedlings, usually at the two- or four-leaf stage, infected *Zinnia elegans*, *Z. pauciflora*, *Z. verticillata*, sunflower, *Arctium minus*, *A. nemorosum*, *Xanthium chinense*, *X. spinosum*, *X. strumarium*, *Mikania scandens*, *Hieracium alpinum*, *H. prenanthoides*, *Inula helenium*, *Carlina acaulis*, *Lactuca perennis*, *Cosmos* sp., *Scorzonera hispanica*, *Felicia amelloides*, *Salpiglossis sinuata*, and *Cerinthe major*. Isolates from *Phlox paniculata*, *P. maculata*, and their hybrids were restricted to *P. drummondii* and *P. maculata*. An isolate from squash was restricted to the Cucurbitaceae [25, p. 24; 32, p. 215].

A comparison of the perithecia of the phlox and zinnia isolates and the conidia of these and the cucurbit isolate revealed no grounds for specific separation. The mildews from these hosts are best recognized as special forms of *E. cichoracearum*.

Imazeki (R.) & Toki (S.). **A winter loving mushroom. Pleurotus spodoleucus (Fr.) Quél.**—*Bull. For. Exp. Sta. Tokyo* 53, pp. 69–77, 4 pl., 1952. [Japanese, with English summary.]

During the winter in the mountain region of northern Honsyu [? Honshu], Japan, *Pleurotus spodoleucus* [*R.A.M.*, 32, p. 391] occurs commonly on fallen trunks of beech (*Fagus crenata*) and occasionally on *Acer pictum*.

Apostolides (C. A.). **Contribution to the mycological flora of Greece.** –*Ann. Inst. phytopath. Benaki*, 6, 2, pp. 62–78, 1952.

This systematic list of the fungi collected by the author throughout Greece [*R.A.M.*, 32, p. 645 and next abstract] from 1932 to 1939 includes two new species and several new records. *Marssonia juglandis* [*Gnomonia leptostyla*: 31, p. 353] is reported on walnut, *Ramularia cynarae* on globe artichoke [27, p. 350], *Bremia lactucae* (common) on lettuce [C.M.I. map No. 86], *Spondylocladium atrovirens* on potato [No. 233], and *Fusarium vasinfectum* on *Gossypium* sp. [*R.A.M.*, 10, p. 309]. *Pseudomonas tabacum* [C.M.I. map No. 293] is present on tobacco leaves throughout the country in summer.

Zachos (D. G.). **Catalogue commenté des champignons et virus rencontrés sur les plantes cultivées en Grèce.** [Annotated list of the fungi and viruses found on cultivated plants in Greece.]—*Ann. Inst. phytopath. Benaki*, 6, 2, pp. 88–90, 1952.

This is a list of 22 fungi and one virus recorded in Greece [cf. *R.A.M.*, 31, p. 256 and preceding abstract].

Bartels (R.). **Serologische Untersuchungen über das Verhalten des Kartoffel-A-Virus in Tabakpflanzen.** [Serological studies on the behaviour of Potato virus A in Tobacco plants.]—*Phytopath. Z.*, 21, 4, pp. 395–406, 3 graphs, 1954.

The quality of antisera for the diagnosis of plant viroses is largely dependent on the concentration of the antigen obtained from the various hosts. Particularly in the case of viruses which are present only in relatively small quantities is it important that the diseased leaves should be collected at the time of maximum concentration. Experiments are described from the Institute for Bacteriology and Serology, Braunschweig-Gliesmarode, Germany, to determine this period for potato virus A in Samsun and White Burley tobacco [*R.A.M.*, 33, p. 187], using the serological leaflet method. In both varieties the maximum concentration was reached in the sixth week after inoculation. Samsun yielded larger quantities of the virus and is therefore more suitable for serum production, but the level fluctuated considerably at different times (probably owing to the presence of an inhibitor), falling to zero within a few weeks of the onset of flowering. White Burley, which does not undergo comparable alterations, is consequently recommended as a permanent host.

Nariani (T. K.) & Pathanian (P. S.). **Physalis peruviana L. a new host of Tobacco leaf-curl virus.**—*Indian Phytopath.*, 6 (*1953*), 2, pp. 143–145, 2 figs., 1954.

A severe disease of *Physalis peruviana*, causing stunting of the plants and dwarfing and curling of the leaves, with the production of vein enations on the lower surface at the Indian Agricultural Research Institute, New Delhi, during the summer of 1953, was found by transmission experiments to be caused by the tobacco leaf curl virus [*R.A.M.*, 31, p. 541; 33, p. 711].

McEvoy (E. T.). **The relation of ammonium and sulphate ions to magnesium deficiency in Tobacco.**—*Canad. J. agric. Sci.*, 34, 3, pp. 281–287, 1954.

In a sand-culture experiment at the Central Experimental Farm, Ottawa, Canada, the yield of White Mammoth flue-cured tobacco decreased with increased ammonium supply. High ammonium combined with either intermediate or high sulphate supply resulted in chlorosis typical of magnesium deficiency [*R.A.M.*, 29, p. 233; 33, p. 766]. The magnesium content of the leaves was depressed by each ammonium and sulphate supply independently, though more by the former, and reached its lowest level with high values of the two combined.

Johnson (E. M.) & Valleau (W. D.). **Heterothallism in Phytophthora parasitica var. nicotianae.**—*Phytopathology*, 44, 6, pp. 312–313, 1 fig., 1954.

Of 35 monospore isolates of *Phytophthora parasitica* var. *nicotianae* from tobacco affected by black shank in Kentucky [*R.A.M.*, 32, p. 217], which were used in various combinations in mating studies at the State Agricultural Experiment Station, 33 were oogonial and two antheridial. Oospores with amphigynous antheridia, averaging 23·1 μ in diameter [cf. 7, p. 601; 10, p. 754], developed only when an antheridial and an oogonial strain were paired on agar containing fresh green tobacco leaf extract.

These results suggest the presence in Kentucky of four strains of the fungus, comprising two distinct antheridial, one of which (culture 1120) mated with 33 and

the other (1127) with only 11 oogonial strains, and at least two oogonial, one mating with culture 1127 and the other failing to do so.

It is stated in a footnote that since the acceptance of this paper for publication six cultures of *P. parasitica* var. *nicotianae* have been received from North Carolina and one from Virginia, all antheridial, together with one oogonial from east Tennessee.

Stephen (R. C.). **Research into diseases of Tobacco.**—*Rhod. Tobacco*, 4, pp. 26–27, 3 figs., 1954.

Research on tobacco diseases in Southern Rhodesia has been directed towards obtaining material resistant to disease and the investigation of cultural practices in relation to disease incidence [*R.A.M.*, 11, p. 206 *et passim*].

Lines resistant to tobacco mosaic virus [29, p. 586] have been tested over many years. M 46 Vamorr 50 appears to be the best, though there is room for improvement in its quality. Several sources of semi-complete immunity from *Erysiphe cichoracearum* are known in members of the tobacco family far removed from the commercial type, and production of a variety incorporating such resistance with good yield and quality has been undertaken. On the other hand, none of the varieties and species (numbering over 100) tested for their reactions to *Alternaria longipes* and *Cercospora nicotianae* has proved sufficiently resistant to justify inclusion in a breeding programme. V 63 Delcrest, V 136 Virginia Gold, and V 148 Hicks have consistently shown the least infection, while V 31 Gold Dollar and V 17 White Stem Orinoco are the most susceptible. Early planting is an important contributory factor in the control of various tobacco diseases, including *C. nicotianae*, of which there was 60 per cent. less in a stand planted early in November than in one planted late in December. It was confirmed that damage from the more serious 'barn spot' phase of the disease may be substantially reduced by a modification in the curing technique involving yellowing of the mature leaf at 100° F. at a relative humidity approaching 100 per cent. [18, p. 483].

Siegel (A.) & Wildman (S. G.). **Some natural relationships among strains of Tobacco mosaic virus.**—*Phytopathology*, 44, 6, pp. 277–282, 1 graph, 1954.

At the Botany Department, University of Los Angeles, California, strains of tobacco mosaic virus were found to differ among themselves in two new ways, colour [*R.A.M.*, 33, p. 452] and sensitivity to inactivation by ultra-violet light [16, pp. 213, 568; 32, p. 469]. Eight were characterized in respect of these properties as well as of the symptoms they induced on Turkish Samsun tobacco and *Nicotiana sylvestris* and of electrophoretic mobility [29, p. 127; 31, p. 211]. They fell into four natural groups. Within a group, strains are distinguishable only by their effects on tobacco. Two strains causing identical symptoms on tobacco differed in response to all the four other criteria applied; they were U2, the agent of a mild form of light to dark green mosaic, and U7, isolated from a sample that had been irradiated with ultra-violet light, leaving only about 10 per cent. of the original preparation infective.

A correlation was established between the physical and chemical attributes of U6, isolated from a yellow area on a leaf systemically infected by a Wisconsin strain of the virus, and the type of reaction elicited on *N. sylvestris*.

Allington (W. B.) & Laird (E. F.). **The infection of Nicotiana glutinosa with Tobacco mosaic virus as affected by potassium nutrition.**—*Phytopathology*, 44, 6, pp. 297–299, 1954.

Studies are reported from Nebraska Agricultural Experiment Station on the effect of potassium nutrition on the duration of the receptive condition of wounded leaf areas for tobacco mosaic virus establishment [*R.A.M.*, 14, p. 659], using

Nicotiana glutinosa as the test plant. Potassium deficiency enhanced susceptibility to infection, the incidence of which in some cases was higher when inoculation was performed up to one minute after wounding. In general, receptivity to the virus persisted longer and at a much higher level in the low-potassium plants than in those plentifully supplied with the fertilizer.

Benda (G. T. A.) & Naylor (A. W.). **On the Tobacco ringspot disease I. Localization of recovery.**—*Amer. J. Bot.*, 41, 10, pp. 799–803, 1954.

This joint investigation from the Virus Research Laboratory, University of California, Berkeley, and the Department of Botany, Duke University, Durham, North Carolina, was concerned with the determination of the mechanism wherein resides the recovery from tobacco ring spot virus of the various parts of Turkish tobacco plants [*R.A.M.*, 23, p. 280]. Leaves that recovered remained symptomless when grafted to healthy stems or when grown as cuttings, but healthy leaves grafted to recovered plants developed symptoms. The axillary buds of recovered plants produced symptomless shoots when budded into healthy stock while the axillary shoots of the stock developed typical symptoms. In one case an adventitious bud developing from a recovered leaf also showed symptoms. Different shoots on the same diseased plant did not necessarily recover simultaneously. It is concluded that the mechanism of recovery of a leaf lies within the leaf itself.

Day (P. R.). **Physiologic specialization of Cladosporium fulvum in England and Wales.**—*Plant Path.*, 3, 2, pp. 35–39, 2 maps, 1954.

During 1951 a preliminary survey carried out in England and Wales with the assistance of the National Agricultural Advisory Service showed that four physiologic races of *Cladosporium fulvum* [*R.A.M.*, 30, p. 250] were present, equivalent to the Canadian races 1, 2, 5, and 8 [loc. cit.] tested on the same differential tomato varieties. In 1953 these four were again found, together with others equivalent to the Canadian races 7 and 9. Race 1 predominated on susceptible varieties and was by far the most prevalent, being present in most of the areas sampled; the specialized races occurred more commonly on resistant varieties. Races 2, 5, and 8 (and probably 9) were not confined to any one area. Several varieties, such as Antimold B and Sapsford's No. 1, are still of great use to growers because of the comparative scarcity of races to which they are susceptible.

The results reveal a general similarity in the progress of physiologic specialization of the fungus in Canada and in this country. Resistance is of less importance in Britain [33, p. 767] and the progress of the fungus has been slower. Further breeding work is in progress at the John Innes Horticultural Institute, Bayfordbury, Hertfordshire, and other centres.

Walker (J. C.), Gallegly (M. E.), Bloom (J. R.), & Scheffer (R. P.). **Relation of plant nutrition to disease development VIII. Verticillium wilt of Tomato.**—*Amer. J. Bot.*, 41, 9, pp. 760–762, 1954.

As a further contribution to this series [cf. *R.A.M.*, 31, p. 418] Bonny Best tomato seedlings inoculated with the *Verticillium* wilt fungus (*V. albo-atrum*) [31, p. 35; 33, p. 692] by dipping the roots in blended mycelial mats in distilled water were grown for 25 to 40 days at 18° to 20° C. in drip-sand cultures at various levels of balanced nutrient concentrations and others at low and high levels of nitrogen, phosphorus, and potassium. In general the rate of disease development increased with increase in nutrient concentration but the effect was less pronounced than that of bacterial canker [*Corynebacterium michiganense*: 27, p. 393] and ring rot [*C. sepedonicum*: 31, p. 417] and often insignificant before the end of the experiment. In unbalanced solutions the rate of disease development

was changed significantly only in the low nitrogen series, where there was always a retardation in comparison with the corresponding balanced solution [23, p. 154].

Deuel (H.). **Über Störungen des Spurenelementhaushaltes der Pflanzen durch Welketoxine (Literaturbesprechung).** [On disturbances of the trace element economy of plants by wilt toxins (discussion of the literature).]—*Phytopath. Z.*, 21, 4, pp. 337–348, 1954.

The biological effects of chelate-formers and metal chelates on the vital processes of plant cells are discussed in the light of 79 contributions to the literature. Certain wilt toxins, e.g., lycomarasmin and fusarinic acid, secreted by *Fusarium* [*bulbigenum* var.] *lycopersici* [*R.A.M.*, 32, p. 270; 33, p. 453, and next abstract], would appear from their molecular structure and the evidence contained in a series of physico-chemical and biological studies to injure their hosts through the formation of metal chelates [cf. 33, p. 122].

Gäumann (E.) & Naef-Roth (St[ephi]). **Über die chelierende Wirkung einiger Welketoxine I.** [On the chelating effect of some wilt toxins I.]—*Phytopath. Z.*, 21, 4, pp. 349–366, 3 figs., 3 graphs, 1954.

In experiments at the Federal Technical Institute, Zürich, the chelating effect on tomato shoots of complexon III (the disodium salt of ethylenediaminotetra-acetic [or sequestric] acid with a molecular weight of 372·1), which presents analogies with the toxins of *Fusarium* [*bulbigenum* var.] *lycopersici*, fusarinic acid and lycomarasmin [see preceding abstract], was found to depend on the amount of tomato ash added to the solution, being reduced to a minimum by a concentration of roughly 10 per cent.

Volcani (Z[afrira]) & Wahl (I.). **Bacterial soft rot on Tomato fruits affected by the late blight fungus.**—*Phytopathology*, 44, 5, pp. 274–275, 1 fig., 1954.

In the course of frequent surveys of tomato fields in Israel during the latter part of April, 1951, rapid development of soft rot (*Bacillus subtilis*) was observed in fruits severely infected by blight (*Phytophthora infestans*) [cf. *R.A.M.*, 31, p. 253] after a change from cool to warm weather. Both organisms were isolated from the necrotic tissues, while the adjacent areas far beyond yielded only the bacterium.

The results of inoculation experiments showed that *B. subtilis* can induce soft rot of injured fruits at a relatively high temperature (33° C.) provided its ingress is facilitated by blight infection, but at high temperatures unfavourable to blight neither pathogen will develop in uninjured parts.

Fulton (J. P.). **Disease control increases Tomato yields.**—*Arkans. Fm Res.*, 3, 2, p. 6, 1 diag., 1954.

In field trials for the control of the tomato leaf-spotting diseases (*Septoria* [*lycopersici*] and *Alternaria* [*solani*]) [*R.A.M.*, 33, p. 55] in Arkansas from 1949 to 1951, inclusive, a yield of over nine tons per acre was obtained with zineb spray (2 lb. in 100 gals. water) compared with 6½ (Rutgers), 4 (Fortune), and 2½ (Fortune) tons for the three years, respectively, from the untreated plots. Tribasic copper sulphate spray (3 lb.) was almost as effective in 1949 and 1950, and is advisable where buckeye rot [*Phytophthora parasitica*] is a factor. In 1948 when this disease was serious there were 68,976 rotted fruits per acre on untreated plots, compared with 26,400 on the copper-sprayed and 53,088 in the zineb-sprayed. Zineb dusts were much less effective than the sprays.

Bibliography of Forestry and Forest Products. July–December 1952.—iv+118 pp., Rome, F.A.O., 1952. [Mimeographed.]

This is the last volume in a series giving month by month a bibliography of

recent literature of interest to foresters. The list is divided into sections under headings in English, French, and Spanish. There is a section on pathology and one on wood preservation.

Zaleski (K.) & Glaser (T.). **Grzyby pasożytnicze i saporoficzne (z wyjątkiem Agaricaceae i Boletaceae) Państwowego Nadleśnictwa Wolsztyn zebrane w latach 1949–1950.** [Parasitic and saprophytic fungi (excluding Agaricaceae and Boletaceae) of the Wolsztyn State forests collected in the years 1949–1950.] —*Acta Soc. Bot. Polon.*, 22, 3, pp. 633–652, 1953. [English summary.]

A list is given of 101 fungus species, including nine believed to be new records, collected in the forests in the Poznań province, Poland.

Peace (T. R.). **The testing of Poplars for their reaction to disease.** —[*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, 8 pp., 1953. [Abs. in *For. Abstr.*, 15, 4, p. 466, 1954.]

The author discusses briefly trials either in progress [in Great Britain], or envisaged, on the resistance of poplar varieties and clones to frost and wind damage, *Dothichiza* canker and die-back [*D. populea*: cf. *R.A.M.*, 33, pp. 569, 694], and *Melampsora* rust [*M.* spp.: 32, p. 107] and deals in more detail with experimental inoculations with *Pseudomonas syringae* f. *populae* [34, p. 1] and the planting of young trees on sites exposed to heavy natural infections.

Houtzagers (G.). **Forest genetics and Poplar breeding in the Netherlands. II. Poplar breeding in the Netherlands.** —*Euphytica*, 1, 3, pp. 161–174, 6 figs., 1952. [Dutch summary.]

In Holland, single-row roadside and boundary plantations of poplar trees extend for over 16,000 km. The yearly production of poplar wood is 135,000 cu. m., and it is the aim of the Plant Breeding Section of the Agricultural University, Wageningen, to improve this by breeding fast-growing, straight-boled poplars that are also resistant to canker (*Pseudomonas rimaefaciens*) [*R.A.M.*, 31, p. 260], the work on which is reviewed.

Biraghi (A.). **Possible active resistance to Endothia parasitica in Castanea crenata.** —[*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, 2 pp., 1953. [Abs. in *For. Abstr.*, 15, 4, pp. 465–466, 1954.]

An example of resistance to *Endothia parasitica* in chestnut [*R.A.M.*, 32, p. 459 and next abstract] is discussed; others have since been found. Some species may carry a resistance character which can be released only after severe and repeated infection.

Beattie (R. K.) & Diller (J. D.). **Fifty years of Chestnut blight in America.**—*J. For.*, 52, 5, pp. 323–329, 7 figs., 1954.

This is a brief review of the history, distribution, and spread in the United States over the last 50 years of chestnut blight (*Endothia parasitica*) [*R.A.M.*, 32, p. 615], control investigations, and breeding for resistance [see preceding abstract]. It is stated that between 1947 and 1954 the United States Division of Forest Pathology established in 11 eastern States 13 hybrid test plots each with 50 specimens of Clapper's, Graves', and Chinese (P.I. 58602) hybrids. The last mentioned is the most promising and is recommended for small-block plantings; it will furnish within a decade a source of seed for further afforestation with chestnut in other areas.

Govi (G.) & Di Caro (S.). **Presenza dell' Ophiostoma fagi Loos su Castagne.** [The presence of *Ophiostoma fagi* Loos on Chestnuts.]—*Ann. Sper. agr.*, 7, 1, pp. 211–219, 6 figs., 1953. [English summary.]

For several years past chestnut fruits in Italy have been infected internally by

a fungus associated with insect galleries, the condition often being characterized by an extensive zone of dry rot. Isolations from infected nuts grown at Avellino in 1949 showed the fungus to be *Ophiostoma fagi* [cf. *R.A.M.*, 14, p. 274], not previously recorded in Italy. In culture on malt agar the conidia measured 2·6 to 4·7 by 1·3 to 2·5 (average 3·5 by 2·2) μ; the perithecia were 120 to 230 μ in diameter, with a beak 630 to 1720 μ long; the ascospores (observed only on the original material, not in culture) were 2·6 to 3·9 by 1·3 (average 3·2 by 1·3) μ.

When deep holes resembling insect galleries were made in chestnut fruits and inoculum placed therein, the fungus gave rise to a dry rot of a small zone of the cotyledons.

FRANCKE-GROSMANN (H[ELENE]). **Ceratostomella procumbens Fuck. als gelegentlicher Begleiter von Asterolecanium-Befall an Roteichen.** [*Ceratostomella procumbens* Fuck. as an occasional concomitant of *Asterolecanium* attack on Red Oaks.]—*Z. PflKrankh.*, 61, 9, pp. 444–447, 1 fig., 1954. [English summary.]

The investigation of a die-back affecting a group of red oaks (*Quercus borealis*) in a park at Reinbek, near Hamburg, Germany, revealed infestation of the branches by *Asterolecanium variolosum*, and fresh material from the cortex yielded in pure culture on malt agar *Ceratostomella procumbens* (Fuckel in *Jb. Ver. Naturk. Nassau*, 23–24, p. 128, 1869–70). An amplified diagnosis is given of the fungus, which differs from related species of *Ophiostoma* in its more stable asci, measuring 18 to 20 by 4·5 to 5 μ, each containing eight hyaline, falcate ascospores, 5·6 by 1·5 μ, and in the presence of paraphyses. Inoculation experiments on healthy red oaks indicated that *C. procumbens* probably does not cause die-back.

MEREK (E. L.) & FERGUS (C. L.). **Longevity of the Oak wilt fungus in diseased trees.**—*Phytopathology*, 44, 6, p. 328, 1954.

The most significant result of preliminary studies at the Pennsylvania State College on the longevity of *Endoconidiophora fagacearum* [*Chalara quercina*: *R.A.M.*, 33, p. 694] in ten dying red oaks [*Quercus borealis*] felled in 1952 was the maximum periods for successful isolation of the fungus, indicating its ability for survival in differently treated material. They were as follows: twigs in the forest and in desiccators, three and 11 weeks, respectively; peeled and unpeeled billets, 1½ and 44 weeks; sawdust, at time of sawing only; and roots of stumps treated with ammate (1 lb. per gal. water), sodium arsenite (4 lb.), and 2,4,5-T (4 per cent. by volume in kerosene), 44, 22, and 15 weeks, respectively.

In connexion with the relative brevity of these survival periods, it is noted that the experiments were performed during a very dry summer. Under other seasonal conditions *C. quercina* might attain greater longevity [cf. 32, p. 650].

WHITE (IRENE G.). **Physiology of Endoconidiophora fagacearum, the fungus causing Oak wilt, with special reference to growth and toxin production in synthetic media.**—*Diss. Abstr.*, 14, 3, pp. 450–451, 1954.

In studies at Vanderbilt University the optimum pH for the growth of three strains of *Endoconidiophora fagacearum* [*Chalara quercina*: *R.A.M.*, 33, pp. 267, 768] on two different media was 3 to 4·5. Of 22 compounds tested cellobiose, levulose, glucose, xylose, starch, and dextrin were excellent as sole sources of carbon. The fungus was unable to use nitrate nitrogen for growth but utilized ammonium or amino nitrogen. Ornithine and arginine hydrochlorides, aspartic and glutamic acids, and alanine were the best nitrogen sources of 24 amino acids tested. Optimum growth in stationary culture was secured at a glucose level of approximately 10 per cent., asparagine at 0·2 per cent., and a temperature of 27° C. There were no specific vitamin requirements. The pathogen excreted into the culture medium a substance producing wilting symptoms in oak leaves. Filtrates of strain OW-25 grown in shake culture for 28 days produced wilting when diluted tenfold. Growth in shake

culture was greatly in excess of that in stationary culture, toxin production occurred earlier, and higher titres were produced. The toxin was apparently unaffected by pH within the range 2·5 to 9; it was non-volatile and heat-stable under the conditions of the test. That produced in shake culture had at least two components: an alcohol-insoluble precipitate resembling a polysaccharide, which caused only drying of oak leaves, and an alcohol-soluble fraction producing dark necrotic areas. Evidence of melanin production by *C. quercina* is presented.

Redmond (D. R.) & Robinson (Miss R. C.). **Poria cocos in the Maritimes.**—*Bi-m. Progr. Rep. Dep. Agric. Can.*, 8, 5, p. 1, 1952. [Received 1953.]

Poria cocos [cf. *R.A.M.*, 24, p. 296; 34, p. 5], not before reported from the Canadian Maritime Provinces, was recently found with several other species of fungi causing butt rot of yellow birch (*Betula lutea*) in eastern Nova Scotia [32, p. 519]. Pieces of roots inoculated with *P. cocos* all became completely covered with mycelium within a week and the bark began to slough off. Three three-year-old yellow birch saplings, growing in pots of unsterilized soil in which *P. cocos* could not be found, were inoculated with the fungus. In every case the leaves wilted and turned brown within three days, and by the fourth day the roots were badly decayed, *P. cocos* being reisolated from root samples from each dead seedling.

Kouyeas (V.). **The foot rot of Pistachio tree (Pistacia vera L.).**—*Ann. Inst. phytopath. Benaki*, 6, 2, pp. 81–87, 3 pl., 1952. [Received December, 1953.]

In August, 1951, an irrigated pistachio tree (*Pistacia vera* grafted on *P. terebinthus* 15 cm. below the soil), growing near Athens, Greece, wilted completely in two days, the leaves becoming dry and yellow. Resin was secreted in vast quantities from the lower part of the trunk. The cambium was blackened and steeped in resin, the discoloration encircling the trunk and extending on one side to 60 cm. above soil level, leaving the root tissues healthy. Isolations from diseased tissue yielded cultures of *Phytophthora parasitica* var. *macrospora*, not apparently recorded on this host. In pathogenicity experiments the fungus infected wounded, one-year-old *Pistacia vera* seedlings inoculated in April and May, but not those inoculated in June. The pathogen was reisolated from the infected plants. All the inoculations on *P. terebinthus*, the usual stock for *P. vera* in Greece, were negative, indicating that it is immune. No infection took place during the hot summer months owing to the high rate of resin secretion.

Prevention of the disease lies in employing *P. terebinthus*, budded high, as stocks in new plantations. Suggested control measures include preventing irrigation water from coming in contact with the trunk, avoiding trunk wounds, smearing the trunks in spring with Bordeaux or copper-zinc paste as a preventive measure or, if the trees are already attacked, scraping off the diseased portion and smearing the wounds.

Goode (M. J.) & Parris (G. K.). **Additions to our knowledge of the life cycle of Taphrina coerulescens.**—Abs. in *Phytopathology*, 44, 6, p. 332, 1954.

In further studies on *Taphrina coerulescens*, the agent of oak leaf blister [*R.A.M.*, 32, p. 37], the ascospores were observed to form 'primary' conidia by budding while still in the ascus. On release from the asci these conidia either germinate immediately or not until midsummer or even the following spring. 'Secondary' conidia are produced and function in a similar manner, and both forms infect the leaves just as the buds are bursting. Under the climatic conditions prevailing in Mississippi, all the *Quercus* varieties tested except *Q. stellata*, *Q. palustris*, and *Q. shumardii* are highly susceptible to infection by *T. coerulescens*.

ZILLER (W. G.). **Studies of western tree rusts. I. A new cone rust on Sitka Spruce.**—*Canad. J. Bot.*, 32, 3, pp. 432–439, 1 pl., 1954.

Samples of Sitka spruce cones bearing the aecidial state of a *Chrysomyxa* sp. were received from the Queen Charlotte Islands in August, 1949, and from near Massett, Graham Island, in September, 1951. In May, 1952, uredo- and teleutosori were found on a plant of *Moneses uniflora* in the same area. In September, 1952, three healthy *M. uniflora* plants, two of *Pyrola uliginosa*, and one of *P. secunda* in an area free from natural infection were inoculated by dusting the moistened stomata-bearing parts with dry, fresh aecidiospores from the cones, and enclosed in plastic bags. By the following March uredo- and teleutosori of the *Chrysomyxa* had appeared on the lower stem and leaves of all inoculated plants of *M. uniflora* and two new rusted sprouts had emerged from the roots. All the other plants were free from rust.

The results of these experiments and of field observations, and the similarity of the aecidio- and uredospore markings, indicate that the cone rust is the aecidial state of a hitherto undescribed *Chrysomyxa* designated *C. monesis* n.sp. It differs from *C. pyrolae* [*R.A.M.*, 31, p. 147] in the rectangular and fluted projections of the aecidio- and uredospores and its more limited host range and geographical distribution.

As the rust may be carried on spruce seed to new areas surface sterilization before export is recommended.

SCHMID (ROSWITHA). **Über die histologische Spezialisierung von Blatt- und Rindenpilzen, mit besonderer Berücksichtigung ihrer Beziehungen zum Phloem.** [On the histological specialization of leaf and bark fungi, with special reference to their connexions with the phloem.]—*Phytopath. Z.*, 21, 4, pp. 407–432, 17 figs., 1954.

Anatomical studies at the Institute of Forest Botany, Munich, Germany, showed that the hyphae of *Armillaria mellea* are at first confined to the outer layers of spruce [*R.A.M.*, 34, p. 6], predominating in the sieve-cells of the sieve tubes. In the later stages of infection the dissolution of the sieve-cell walls produces lacunae between the severely damaged, resinified parenchyma cells. Hyphal growth is preceded by injury to the tissue and followed by resinosis and death. From the cortex the hyphae penetrate the xylem and cause disintegration.

The hyphae of *Cronartium ribicola* in white pine (*Pinus strobus*) and *C. asclepiadeum* [cf. 17, p. 752] in Scots pine (*P. sylvestris*) predominate in the parenchyma and medullary rays, the cells of which they attack partly by means of haustoria. *C. ribicola* also frequently grows within the sieve-cells, penetrating the walls by numerous slender side branches. Injury precedes hyphal growth and consists primarily in degeneration of the cambium. In the later stages the entire cortical tissue becomes resinous and necrotic, while the hyphae continue to spread through the xylem, passing from the medullary rays both between and into the tracheids. The hyphal development of *C. asclepiadeum* is almost exclusively intertracheal. The hyphae of *Coleosporium senecionis* [cf. 29, p. 404] are confined to the assimilation parenchyma of pine needles.

The growth of *Melampsorella caryophyllacearum* [16, p. 350] in *Abies* spp. and of *Gymnosporangium sabinae* [33, p. 206] in *Juniperus pyramidalis* is generally restricted to the cortex, especially the parenchyma and medullary ray cells. The hyphae of *G. sabinae* are exclusively intercellular, forming only protrusions that do not penetrate the walls, whereas copious haustorial formation is a conspicuous feature of *M. caryophyllacearum*. In the sieve-cell region the hyphae of both rusts are intercellular with external protrusions. In the inner phloem the relatively sparse hyphae are located principally round the medullary rays.

It is considered highly probable that species of *Coleosporium*, *Melampsorella*,

and *Gymnosporangium* can utilize the translocated metabolic products in their respective hosts.

RENNERFELT (E.). **Biologische Untersuchungen über den Kieferndreher Melampsora pinitorqua (Braun) Rostr.** [Biological research on the Pine-twister *Melampsora pinitorqua* (Braun) Rostr.]—[*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, 5 pp., 1953. [Abs. in *For. Abstr.*, 15, 4, p. 462, 1954.]

The apparent increasing incidence of *Melampsora pinitorqua* [cf. *R.A.M.*, 31, p. 147; 32, p. 408] in Sweden is attributed partly to increased cutting of aspen (*Populus tremula* and *P. tremuloides*) for firewood with consequent suckering, partly to the increase in clear felling and replanting with pine in large areas, and possibly to climatic changes. Control by spraying young pines and by the chemical or mechanical eradication of aspen suckers is discussed briefly. Some pine clones are more resistant than others and laboratory tests demonstrated that while aecidia were present on the leaves of *P. alba*, *P. tremula*, and *P. tremuloides*, uredospores developed only on *P. tremula*.

MOLNAR (A. C.). **A disease causing flagging on Ponderosa Pine.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, 10, 3, p. 4, 1954.

Severe flagging was reported in a recently pruned, 15- to 30-year-old stand of *Pinus ponderosa* near Kelowna, Kamloops Forest District, British Columbia. The flagging appeared to be unrelated to pruning wounds, but to have resulted from girdling lesions on twigs and branches remote from any apparent injury. Fructifications of *Cenangium ferruginosum* [cf. *R.A.M.*, 31, p. 516; 32, p. 598] were abundant on the diseased material. Of 300 trees sampled, under 3 per cent. were dead when examined; 23 per cent. had sustained flagging of apparently vigorous branches in the upper crown, but only 5 per cent. had lost more than 50 per cent. of their foliage. The appearance of the symptoms had been preceded by two years of severe drought, though loss of host vigour was not apparent.

Cultures of single spores from apothecia of *C. ferruginosum* were identical with cultures from diseased tissues. Apothecia were frequently obtained in advance of necrosis, the fungus being able, apparently, to invade living tissue. Inoculation tests are projected to confirm the pathogenicity of the fungus and to determine its relation to flagging.

PATTON (R. F.) & RIKER (A. J.). **Needle droop and needle blight of Red Pine.**—*J. For.*, 52, 6, pp. 412–418, 1 fig., 1954.

Symptoms of needle droop [*R.A.M.*, 19, p. 445] and needle blight [21, p. 356; 33, p. 512] of red pine (*Pinus resinosa*) in Wisconsin are compared. The authors regard these two diseases as quite distinct from one another. Needle blight is caused by a gall midge larva [Cecidomyiidae]. In needle droop the affected needles do not fall off readily and there are dark, resinous lesions on green needles, near the lower limit of injury. It is a much more serious disease than needle blight in Wisconsin plantations and was severe in 1947, 1950, and 1951. Investigations indicate that it is the direct result of a low ratio of absorption to transpiration over a relatively short period of time, perhaps even a few hours. Typical symptoms appeared in trials when conditions favoured rapid drying of the needles and stems and were reproduced readily by inducing transpiration with a limited soil moisture supply. The succulent tissue in the needle base collapses, the needles droop and die, and in extreme cases twigs become very desiccated and die also. Though *Pullularia pullulans* is commonly associated with the lesions, inoculations showed that it plays no part in the initial cause of droop.

Boyce (J. S.). **Hypoderma needle blight of Southern Pines.**—*J. For.*, 52, 7, pp. 496–498, 1954.

Observations from 1949 to 1952 and inoculations in 1951 in North and South Carolina, Georgia, Florida, and Virginia showed that *Hypoderma lethale* [*R.A.M.*, 33, p. 60], the cause of spring needle blight [33, p. 693] on many species of pine, is probably largely responsible for the widespread needle browning which is periodically severe at this time of the year in the southern United States on several hard pines of all ages, except longleaf [*Pinus palustris*]. Ascospores of the fungus are produced mostly in June and July. The fungus was also observed on *Pinus echinata*, *P. taeda*, *P. rigida*, and Table Mountain pine. *Scirrhia acicola* is also an important cause of needle blight in this area.

Wakeley (P. C.). **Planting the Southern Pines.**—*Agric. Monogr. U.S. Dep. Agric. For. Serv.* 18, v+233 pp., 62 figs., 2 maps, 1954.

In this monograph, which supersedes *Tech. Bull. U.S. Dep. Agric.* 492, all the aspects of planting southern pines, including loblolly (*Pinus taeda*), slash (*P. elliottii*), longleaf (*P. palustris*), and shortleaf (*P. echinata*), are discussed from the available literature (811 titles). Included are sections on fungus and other diseases affecting pine nurseries (pp. 89–94) and plantations (pp. 157–164), the importance of mycorrhiza (p. 118), and an appendix on fungicides (pp. 208–211), information on which has been noticed from time to time in this *Review*.

Voigt (G. K.). **The effect of fungicides, herbicides, and insecticides on the accumulation of phosphorus by Pinus radiata as determined by the use of P32.**—*Agron. J.*, 46, 11, pp. 511–513, 1 fig., 1954.

The results of greenhouse trials at Wisconsin Agricultural Experiment Station, indicated that some of the pesticides and herbicides tested for their influence on the accumulation of phosphorus by pine (*Pinus radiata*) seedlings and excised root tissues inhibited the process and arrested development. These effects were particularly marked in the cases of aluminium sulphate [cf. *R.A.M.*, 19, p. 682], thiosan, and BHC. On the other hand, allyl alcohol and formalin caused increased absorption of applied phosphorus and stimulated seedling growth. Determinations of the oxygen uptake and phosphorus content of excised root tips and mycorrhizal short roots showed that reduction of assimilated phosphorus, as indicated by the relative contents of P32 and total phosphorus in the tissue, was accompanied by a decrease in the oxygen consumption rate, especially in material treated with thiosan and BHC.

The outcome of these studies emphasizes the importance of obtaining uniform distribution of biocides in the soil and of the application of correct dosages to avoid injury to planting stock.

Higuchi (T.) & Kitamura (K.). **Biochemical study of wood-rotting fungi. II. Relation between the Bavendamm reaction and tyrosinase.**—*J. Jap. For. Soc.*, 35, pp. 350–354, 1953. [Abs. in *Chem. Abstr.*, 48, 21, p. 12875, 1954.]

In further studies at the University of Gifu, Japan, on the biochemistry of wood-rotting fungi [*R.A.M.*, 33, p. 648 and next abstract], tyrosine was oxidized by the culture filtrates of some species both of the white and brown rot groups, which were inoculated on nutrient agar containing 1-naphthol for the laccase test and appropriate quantities of tyrosine and *p*-cresol as indicators for tyrosinase. All species of the white rot group except *Stereum frustulosum* were positive for laccase, but none of those causing brown rot. Certain species of both groups, however, gave a positive tyrosinase response, suggesting that for some species both enzymes are concerned in the production of the Bavendamm reaction. 1-naphthol and *p*-cresol

are considered more suitable than gallic acid and tannic acid for the laccase and tyrosinase tests, and the reaction should be divided into laccase and tyrosinase reactions.

Higuchi (T.). **Biochemical study of wood-rotting fungi. III. In vitro experiments on the Bavendamm reaction.**—*J. Jap. For. Soc.*, 36, pp. 22–24, 1954. [Abs. in *Chem. Abstr.*, 48, 21, p. 12875, 1954.]

The results of tests with the Warburg respirometer demonstrated that gallic and tannic acids were oxidized by both laccase and tyrosinase, whereas 1-naphthol was oxidized only by laccase and tyrosine, and *p*-cresol only by tyrosinase [see preceding abstract]. The reaction can therefore be divided into both laccase and tyrosinase reactions. When a laccase or tyrosinase solution was pipetted into stainless steel cylinders on nutrient agar, each containing one substrate, oxidized colour zones similar to those of the Bavendamm reaction developed round the cylinders in 24 hours.

Jagielski (A.). **Badania nad odpornością płyt pilśniowych na działalność grzybów Coniophora cerebella i Merulius lacrymans.** [Studies on the resistance of fibre boards to the action of the fungi *Coniophora cerebella* and *Merulius lacrymans*.] —*Sylwan*, 97, 2, pp. 124–135, 1953.

Tests carried out in Poland on the resistance of fibre board to *Coniophora cerebella* and *Merulius lacrymans*, using the block method, showed that the average loss of dry matter in comparison with fresh untreated pine wood was 1:0·68 and 1:0·35 for the two fungi, respectively.

Klem (G. G.). **Store verdier spares ved impregnering av trevirke.** [Large sums of money are saved by timber preservation.]—*Norsk Landbr.*, 20, 25, pp. 548–550, 1954.

Although timber is so largely used on Norwegian farms, preservation is seldom practised. In this connexion essential information is given on the nature of decay; the three groups of [unspecified] fungi implicated, namely, moulds and the agents of blue stain and rot; the history of preservation from earliest times to the present day; the methods and materials in current use; and the potential annual saving of hundreds of thousands of cubic metres by proper treatment of the wood, with its estimated threefold increase in the duration of service life.

Determining penetration of wood preservatives.—*Tech. Note For. Prod. Lab., U.S. Dep. Agric.*, 163, 2 pp., 1952. [Mimeoprinted. Received 1954.]

Tests are described for ascertaining the depth of penetration of timber preservatives [cf. *R.A.M.*, 32, p. 160], as used by the Forest Products Laboratory, Madison, Wisconsin. Penetration by dark-coloured oils is easily seen on the removal of samples or on sectioning. Pentachlorophenol in light oils may be detected by dusting a mixture of calcium carbonate and oil-soluble red dye (20:1) on freshly cut sections.

The detection of zinc chloride is carried out by spraying a 1:1:1 mixture of one per cent. solutions of potassium ferricyanide and potassium iodide and 5 per cent. soluble starch, which turns treated wood dark blue.

For sodium fluoride an aqueous solution of sodium alizarine sulphonate (2 gm.) in concentrated hydrochloric acid (40 ml.), added at the time of testing to an equal quantity of 1 per cent. zirconium oxychloride, may be used; this turns treated wood yellow and untreated dark red.

Dipping wood treated with mercuric chloride in a solution of hydrogen sulphide turns it black. The presence of copper-containing preservatives is usually obvious

but can be made clearer by the addition of one per cent. 5-diphenyl carbazide in 50 per cent. iso-propyl alcohol, which turns the treated wood purple.

Walters (C. S.). **Hardwood requirements of the Illinois coal-mining industry.**—*Bull. agric. Exp. Sta. Illinois* 554, pp. 499–551, 17 figs., 3 maps, 1952.

This investigation into the 1948 hardwood requirements of the Illinois coal-mining industry showed that of the 40,985,400 bd. ft. of sawn hardwood (mostly oak) products used, only 8·3 per cent. (3,414,510 bd. ft.) was treated against decay. Cross-ties formed 98·2 per cent. of the treated products; they were all pressure-treated with a 70:30 mixture of creosote and coal tar [*R.A.M.*, 32, p. 159] at the rate of 6 lb. per cu. ft. Chromated zinc chloride [31, p. 311] was also used as a preservative, the specified retention being ½ lb. per cu. ft. After 1948 a few mines purchased timber already treated with 2½ per cent. pentachlorophenol [32, p. 159]. The life of treated wood in service in mines ranged from 10 to 20 years as against a minimum of five years for untreated.

From a review of the hardwood supplies in Illinois forests it was concluded that in future they will be adequate to meet the demand.

Palti (J.). **Root diseases and crop rotation of farm and garden crops.**—*Adv. Leafl. agric. Consultants* 7, 8 pp., 7 figs., 1954. [Hebrew.]

Root pathogens occurring in Israel and having a wide host range are listed under the crops they attack, with an indication of relative susceptibility. The fungi include *Sclerotinia sclerotiorum* [*R.A.M.*, 24, p. 253], especially severe on *Brassica* crops and carrots in winter and spring; *Sclerotium rolfsii* [33, p. 339], attacking runner beans [*Phaseolus coccineus*], groundnuts, and beets in the summer; *Sclerotinia bataticola* [*Macrophomina phaseoli*: 26, p. 181] on groundnuts, mostly in summer and autumn; *Rhizoctonia* [*Corticium*] *solani* and *Pythium* spp. on *Brassica* crops; *Fusarium* spp., causing damping-off; and *Verticillium albo-atrum*, responsible for wilt.

The major crops are grouped according to their reactions to root diseases and their consequent place in a rotation designed to reduce losses from these pathogens. Summer and winter cereals and onions are free from root diseases all the year round, but solanaceous crops are highly susceptible. Leguminous crops vary in their reactions and most cucurbit crops are unaffected.

Takahashi (M.) & Morimoto (T.). **On the pathogenicity of pythiaceous fungi to plant seedlings.**—*Forsch. PflKr., Kyoto*, 5, 1, pp. 18–21, 1954. [Japanese, with English summary.]

In a number of pathogenicity tests tomato, *Hibiscus manihot*, *Ipomoea purpurea*, cucumber, and watermelon were most susceptible to attack by *Pythium ultimum*, *P. debaryanum*, *P. aphanidermatum*, *P. hemmianum*, and *P.* sp. (from damped-off horse beans [*Vicia faba*]) while broad beans and rice were unaffected. All cucumber and watermelon varieties were very susceptible to *P. ultimum*, while the resistance of pumpkin and squash varieties was influenced by the environment. Amakuri and Delicious pumpkins were resistant and Kikuza and Tomizu intermediate.

Neenan (M.) & Goodman (O. G.). **Varietal susceptibility of Brassicas to molybdenum deficiency.**—*Nature, Lond.*, 174, 4438, pp. 972–973, 1 fig., 1954.

During 1953 severe symptoms of whiptail [*R.A.M.*, 33, p. 193] occurred in Ireland on the cauliflower varieties Cambridge No. 6 and No. 7 in a commercial plot having an initial pH of 5·3. The variety All-the-Year-Round, which had received identical cultural treatment, was unaffected but showed signs of manganese toxicity. In another plot containing several kinds of *Brassica* the Cambridge varieties again developed severe whiptail, whereas the others were at the most only

slightly affected. The treatment of duplicate plots with sodium molybdate at 2 lb. and 4 lb. per acre effected a considerable improvement and resulted in head formation wherever buttoning had not already taken place. The Cambridge varieties again showed marked susceptibility in 1954 on similar soil types, No. 6 being the most severely affected and No. 7 the least. No. 5, sown in 1954 only, was also affected. The level of available molybdenum in these plots was about 0·14 p.p.m. An apparently new symptom of the deficiency was the production of bell-shaped leaves.

Koch (F.). **Ergebnisse von Spritzversuchen zur Bekämpfung der Blattfleckenkrankheit der Beta-Rüben (Cercospora beticola Sacc.).** [Results of spraying experiments for the control of the leaf spot disease of *Beta* Beets (*Cercospora beticola* Sacc.).]—*Pflanzenschutz*, **6**, 6, pp. 73–77, 2 figs., 1954.

In large-scale spraying experiments for the control of beet leaf spot (*Cercospora beticola*) in Bavaria [*R.A.M.*, 33, pp. 205, 517] during the period from 1951 to 1953, satisfactory results were obtained with oxychlorides containing 45 to 50 per cent. copper or oxides at the same or higher concentrations, four applications being made at the rate of 3 kg. per ha. or three at 4 kg. [cf. 34, p. 14]. Although the great importance of correct timing of the sprays is fully recognized, it has not been possible to predict the likely infection dates for more than one year. For instance, in 1951 the July treatments were of crucial significance, whereas in 1952 decisive results were achieved by those of June and September and in 1953 the critical month was August. Intensive studies on local microclimatic conditions are planned to aid in the solution of this problem.

Taking an average of all the tests, the profits accruing from the spraying operations amounted to seven times the outlay involved.

Drachovská-Šimanová (Miroslava). Исследование сортов Сахарной Свеклы в смысле их предрасположения к церкоспорозу. [A study of Sugar Beet varieties in connexion with their susceptibility to cercosporosis.]—За Соц. Сельскохоз. Науку, Сер. A [*Socialist. agric. Sci., Czechoslovakia*, Ser. A.], **3**, 3, pp. 262–275, 2 figs., 1954.

Field trials, carried out from 1949 to 1951, inclusive, in Czechoslovakia for the selection of sugar beet varieties resistant to leaf spot (*Cercospora beticola*) [*R.A.M.*, **30**, p. 90], indicated that most of the local kinds are intermediate in their reaction and can, therefore, be used in the normal sugar beet growing areas. The recommended varieties include the Polish CLR for fields and areas with regular high disease incidence, but with a long growth period, and MLR for those with an intermediate growth period; the local varieties Dobrovicka C, Voganka, and Zapotil may be used in similar fields in wetter and colder regions, and with the Soviet varieties B23 and Ivanovskaya 1305 are useful for areas where infection is consistently intermediate or sporadically high; Dobrovicka N, Stupice N, and Stupice V may be grown where infection is low. Varietal resistance need not be considered where only isolated infections occur.

Henke (O.). **Untersuchungen des Stoffwechsels vergilbungskranker Zuckerrüben.** [Studies on the metabolism of yellows-diseased Sugar Beets.]—*Zbl. Bakt.*, Abt. 2, **108**, 4–7, pp. 134–147, 1 diag., 1954.

Comparative analyses of root and leaf samples of healthy and yellows virus-diseased sugar beets at the Institute for General Botany, Friedrich-Schiller University, Jena, Germany, revealed no differences between the two lots in respect of moisture and dry matter contents [cf. *R.A.M.*, 33, p. 573]. In the cortex and root tips, but not in the body or medulla, the crude ash content (calculated in mg. per gm. dry matter) was higher in infected than in healthy plants. The alkalinity of

the ash was higher both in the roots and foliage of diseased than of healthy plants. The virus induces a rise in the total acid content of roots and leaves, with a particularly marked increase of citric acid in the foliage. The total sugar content of infected beets amounted to between 60 and 70 per cent. of that of sound ones, but the saccharose content of the former was only half that of the latter. In diseased leaves, on the other hand, the total sugar content was raised through a stoppage of the assimilates by from 27 to 38 per cent. of the dry matter. There was no decrease in the nitrate content of infected as compared with healthy beets, but in the leaves it was reduced from 1·6 to 1 per cent. The total nitrogen content, especially the soluble fractions, was higher in infected than in healthy roots, but in the older leaves it fell from 7·1 to 5·4 per cent. of the dry matter.

Singh (B.) & Gupta (V. C.). **Root rot of Spinach.** *Sci. & Cult.*, 20, 4, p. 189, 1954.

Spinach root rot, caused by *Rhizoctonia* [*Corticium*] *solani* [cf. *R.A.M.*, 30, p. 89], *Fusarium* sp., and *Macrophomina phaseoli* [cf. 33, p. 451], is reported to be widespread in the Uttar Pradesh, India. In inoculation experiments with pure cultures of these fungi, each was able to cause the disease individually or in combination. Infection by *M. phaseoli* resulted in ash-grey roots accompanied by bark shredding.

Sörgel (G.) & Unger (K.). **Über den Befallsverlauf von Mycosphaerella pinodes (Berk. et Blox.) Stone, Ascochyta pinodella Jones und Ascochyta pisi Lib. an Erbsen am natürlichen Standort.** [On the course of infection of *Mycosphaerella pinodes* (Berk. & Blox.) Stone, *Ascochyta pinodella* Jones, and *Ascochyta pisi* Lib. on Peas in the natural habitat.]—*Züchter*, 24, 2–3, pp. 56–68, 3 figs., 11 graphs, 1954.

In further studies on the foot rots of peas at the Plant Breeding Institute, Quedlinburg, Germany [*R.A.M.*, 33, p. 228], *Mycosphaerella pinodes* was more virulent in inoculation tests on the susceptible Kelvedon Wonder variety than *Ascochyta pinodella* and *A. pisi* [32, p. 229; 33, p. 410]. The expansion of the leaves and the elongation of the internodes, petioles, stalks, and tendrils of infected plants are inhibited and premature death ensues. Temperature was found to be the primary factor governing the severity of infection, the optimum lying between 20° and 24° C., followed by atmospheric humidity (optimum exceeding 95 per cent.). By using Unger's thermo-element psychrometer for microclimatic determinations (*Angew. Met.*, 1, pp. 280–282, 1953) it was possible to show differences in susceptibility between individual plants and even between the two sides of a pod exposed to a northerly or southern aspect [cf. *R.A.M.*, 30, p. 299].

Zachos (D. G.). **Un cas d'attaque du Pois par le Cylindrosporium pisi Berger.** [A case of *Cylindrosporium pisi* Berger attacking Peas.]—*Ann. Inst. phytopath. Benaki*, 6, 2, pp. 79–80, 1 pl., 1952.

During March, 1953, peas growing at Markopoulo, Koropi, and Kalyvia in Attica, Greece, were attacked by *Cylindrosporium pisi* [*R.A.M.*, 18, p. 289]. The spores measured 20 to 58 by 2·5 to 4 (average 42 by 3) μ [cf. loc. cit.]. There are indications that *C. pisi* is a secondary parasite confined to plants already weakened by *Ascochyta pisi*.

Simons (J. N.). **Vector-virus relationships of Pea-enation mosaic and the Pea aphid Macrosiphum pisi.**—*Phytopathology*, 44, 6, pp. 283–289, 3 graphs, 1954.

At the Department of Entomology and Parasitology, University of California, Berkeley, pea enation mosaic subinoculated to *Medicago hispida* from sweet pea was transmitted experimentally by *Macrosiphum pisi* [*Acyrthosiphon pisum*], *M. solanifolii* [*M. euphorbiae*: *R.A.M.*, 18, p. 28], *Myzus persicae* [30, p. 355], and *M. ornatus* to Alaska and Laxton Progress peas, Early Flowering Spencer sweet pea,

soy-bean, crimson clover, and *Medicago hispida*, while *M. arabica* was found to be naturally infected.

The acquisition and inoculation threshold periods for adults of *A. pisum* were found to lie between one and two hours and 15 and 20 minutes, respectively. The effect of length of feeding period on the rate of virus acquisition was approximately linear, while that of the test feeding period on transmission rate was logarithmic. A positive correlation was established between the duration of acquisition feeding and that of virus retention.

First-instar nymphs of *A. pisum* were more efficient vectors of pea enation mosaic virus than adults of the same species, the mean latent period in the former being shorter (30 hours) than in the latter (56·8), which might be related to differences in vector efficiency. It was shown that the latent period, where discernible, can be completed on the source plant, but the presence of a latent period for every vector is questioned.

Research work and workers.—*Seed World*, 75, 5, p. 24, 1954.

Western ring spot is the name of a virus identified in Oregon, where it usually occurs in combination with another virus; for example, in Blue Lake bean [*Phaseolus vulgaris*] it may accompany strains of bean yellow mosaic virus [*R.A.M.*, 33, p. 68]. Alone, it is lethal to several varieties of bush beans. In peas it is usually unaccompanied: Perfected Wales, Thomas Laxton, and Alaska peas show the greatest susceptibility, while Perfected Freezer, Delmar, and Perfection are the most resistant.

Thomas (H. R.) & Fisher (H. H.). **A rapid method of testing Snap Beans for resistance to common Bean mosaic virus.**—*Plant Dis. Reptr*, 38, 6, pp. 410–411, 1 fig., 1954. [Multilithed.]

A rapid greenhouse method for testing beans [*Phaseolus vulgaris*] for resistance to bean mosaic virus [*R.A.M.*, 33, p. 574] has been developed at the Plant Industry Station, Beltsville, Maryland. Inoculation is carried out by rubbing the virus extract on newly expanded primary leaves dusted with carborundum, rinsing them with water, and maintaining the plants at 90° F. Under these conditions leaf veinal necrosis develops within three to four days on varieties possessing the dominant Corbett Refugee type of resistance but not on the susceptible ones. Records can be made immediately, without waiting for the development of mottling on susceptible plants, which requires seven to 10 days longer. This method, however, is not suitable for plants with the recessive type of resistance, as no necrosis develops, nor for resistant plants intended for seed increase or crossing, as they may die within a few days.

Brinkerhoff (L. A.), Fink (G.), Kortsen (R. A.), & Swift (D.). **Further studies on the effect of chemical seed treatments on nodulation of legumes.**—*Plant Dis. Reptr*, 38, 6, pp. 393–400, 1 fig., 1954. [Multilithed.]

In field and greenhouse experiments conducted by Oklahoma A & M College, Stillwater, nodulation in soy-beans and cowpeas grown in non-infested soil was reduced or nearly eliminated by seed treatment with phygon, arasan, or spergon prior to inoculation with *Rhizobium* [cf. *R.A.M.*, 33, p. 210]. In the field the reduction was more pronounced in 1951, following a severe drought, than in the excellent 1950 season. The dry method of inoculation was less effective than the wet, regardless of chemical treatment. The addition of nodule inoculum to the seed in no case decreased the protective value of the seed treatments and in one test with shelled groundnuts wet inoculum without a seed protectant reduced the stand. Nodulation with the cowpea-mung bean *Rhizobium* was copious on the Ogden

variety of soy-bean, but the S 100 variety was incompatible with the same strain. Seed treatments had no appreciable effect on nodulation in naturally infested soil.

Cox (R. S.). **Effect of temperature on the development of downy mildew of Lima Bean.**—*Phytopathology*, 44, 6, pp. 325–327, 1954.

In further studies at Delaware Agricultural Experiment Station on the relation of environmental factors to the development of downy mildew (*Phytophthora phaseoli*) in Lima bean [*Phaseolus lunatus*: *R.A.M.*, 33, p. 274], using detached trifoliate leaves and pods of the Henderson Bush variety, initial penetration of the tissues apparently occurred directly through the cuticle. No symptoms appeared when water was used as a substrate, some infection was obtained in the presence of 4 per cent. sucrose, and the maximum degree of severity was reached at 10 per cent.

The incubation at 10° C. of material inoculated with sporangia resulted in no infection; at 15° symptoms developed after eight days and reached a climax after ten; at the optimum of 20° they were first observed after four days and attained maximum severity after six; at 25° only one pod was attacked; and at 30° all tests were again negative. When zoospores were used as inoculum, the disease also failed to develop at 10° or 30°; at 15° the initial symptoms appeared after eight days, at 20° after four, and at the optimum of 25° after 2½. Using various combinations of daily exposure periods at two alternating temperatures, downy mildew developed after 2½ days on sporangia-inoculated leaves successively incubated at 15° for six and at 25° for 18 hours. Other combinations were less favourable; for instance, four hours' daily exposure at 30° for ten days arrested the progress of infection, while 18 continuous hours at the same temperature prevented it altogether.

Neuburg (W. B.), Macgillivray (J. H.), Yamaguchi (M.), & Mann (L. K.). **Wrinkled seed coat defect in green Lima Beans for freezing.**—*Plant Dis. Reptr*, 38, 7, pp. 464–466, 1 fig., 1954. [Multilithed.]

A testa deformity of Lima beans [*Phaseolus lunatus*] in Santa Clara and Monterey Counties, California, affecting chiefly the Concentrated Fordhook variety and associated with stunting of the plants, was responsible for lowering the grade of the frozen product and caused losses of $30,000 to $45,000 per season to some factories. Defective areas of the testa are usually wrinkled on the exterior surface and yellowish-brown and cracked on the interior. Generally only one or two seeds per pod are affected, and these are located away from the point of attachment to the plant. Field observations during August, 1952, indicated that the defect may be caused by poor growing conditions, particularly water shortage. On a light soil with normal irrigation 3·4 per cent. of the beans were wrinkled and 8·8 per cent. when two irrigations were omitted.

It is suggested that concentrated Fordhook should be replaced by U.S. 242 in less favourable climates and on soils of low water-holding capacity. Since the defect increases with maturity, the beans should be harvested just before or at their peak quality, and not allowed to become overmature.

Kono (M.). **Effect of some sulfanilamide compounds upon Fusarium cepae.**—*Forsch. PflKr., Kyoto*, 5, 1, pp. 27–31, 1954. [Japanese, with English summary.]

The inhibitory action of four sulphanilamides on *Fusarium* [*oxysporum* f.] *cepae* from an onion bulb was investigated. In a 10^{-2} M. solution of the most active compound, acetosulphamine, 50 per cent. of the germination of the fungus was inhibited at 28° C. Sulphamine at $7{\cdot}89 \times 10^{-3}$ M. was the most effective inhibitor of mycelial growth, but at 10^{-2} M. did not affect the respiration of the pathogen. Sulzol-s, a substitution of the heterocyclic group in the N^1 position of sulphamine, enhanced the inhibitory action.

Padhi (B.) & Snyder (W. C.). **Stemphylium leaf spot of Lettuce.**—*Phytopathology*, 44, 4, pp. 175–180, 1 fig., 1954.

A disease affecting all the lettuce varieties grown in the Colma coastal district of San Mateo County, California, during the past 20 years, especially during the rainy winter season, is characterized by the development on the leaves of brown circular, zonate spots, often with a pale necrotic centre. The causal organism was found to be a form of *Stemphylium botryosum* the imperfect state of *Pleospora herbarum* [*R.A.M.*, 31, p. 164]. Because of its selective action on lettuce the fungus is designated *S. botryosum* f. *lactucum* n.f., the imperfect state of *P. herbarum* f. *lactucum* n.f.

The spores germinate readily on the leaf over a temperature range from 4° to 37° C., emitting germ-tubes that penetrate the tissues through the stomatal apertures. The invading mycelium destroys the host tissue in advance of fungus growth, but as a rule its development in a living leaf is limited. However, when diseased leaves fall to the ground, growth is resumed in a saprophytic form, and conidia and asci may be produced on infected refuse.

Isolates of *P. herbarum* from different habitats and localities were found to be morphologically similar. Only those originally isolated from lettuce leaf spots and a strain from decaying artichoke buds in the same county reproduced the foliar symptoms on inoculated lettuce plants. *P. herbarum* f. *lactucum* proved to be innocuous in inoculation tests on onion, carrot, bean (*Phaseolus vulgaris*), tomato, and sweet potato.

Morwood (R. B.). **Peanut pre-emergence and crown rot investigations.**—*Qd J. agric. Sci.*, 10, 4, pp. 222–236, 4 figs., 1953.

Crown rot of groundnuts due to *Aspergillus niger* is becoming increasingly serious in Queensland [*R.A.M.*, 29, p. 202] and is threatening the groundnut industry in the South Burnett district. Associated with the disease is a pre-emergence rot, occasionally caused by the same fungus, but more frequently by *Rhizopus arrhizus* [33, p. 66]. The pathogenicity of the two fungi was established in inoculation experiments. Species of *Penicillium*, *Botrytis*, and *Fusarium* were also isolated from affected plants. In addition to the control measures already noticed [26, p. 180], pre-sowing treatment of machine-shelled kernels with an organic mercury dust (containing a minimum of 1·5 per cent. mercury) at 5 oz. per 100 lb. kernels (2½ oz. for Red Spanish) is recommended against both diseases [cf. 33, p. 519]. Crop residues should be incorporated in the soil and not burnt.

Norton (D. C.). **Factors in the development of blue damage to Spanish Peanuts.**—*Phytopathology*, 44, 6, pp. 300–302, 1 fig., 1954.

At Texas Agricultural Experiment Station culture filtrates of *Rhizopus nigricans* [*R. stolonifer*], *Aspergillus flavus*, *A. niger*, two species of *Penicillium*, and *Sclerotium rolfsii*, selected soils, and chemicals of known purity were tested for their ability to produce a blue-black discoloration in Spanish groundnuts [*R.A.M.*, 27, p. 171]. The only filtrates causing intensive blueing in shelled nuts mixed with white quartz sand were those of *A. niger* and *S. rolfsii*; *A. flavus* caused moderate injury. A culture of *S. rolfsii* from which oxalic acid was removed did not produce blue damage.

Oxalic acid, calcium, sodium, potassium, and ammonium oxalates, several inorganic salts, including potassium, sodium, calcium, and ammonium chlorides, and kojic acid induced a blue discoloration when mixed with shelled nuts and sand at a pH between 2·2 and 7; the oxalates were active over a wider range than the inorganic salts.

Blueing also developed when nuts in broken shells were mixed with acid soils at or below pH 6, but not in moist, leached, white quartz sand adjusted to between

pH 6 and 2 by the addition of hydrochloric acid. It is considered probable that the tendency of certain soils to produce blue damage is associated with an acid pH and the presence of various ions.

Under comparable conditions the agents responsible for the blue discoloration in Spanish groundnuts caused similar but less severe injury to the Virginia Bunch and Southeastern Rumer types.

Athow (K. L.) & Caldwell (R. M.). **A comparative study of Diaporthe stem canker and pod and stem blight of Soy-bean.**—*Phytopathology*, 44, 6, pp. 319–325, 2 figs., 1954.

From Purdue University Agricultural Experiment Station, Lafayette, Indiana, the authors present a comparative study of soy-bean stem canker (*Diaporthe phaseolorum* var. *caulivora* n. var., formerly attributed to *D. p.* var. *batatatis* [*R.A.M.*, 33, p. 275]) and pod and stem blight (*D. p.* var. *sojae*) [32, p. 603]. The former is an acute disease, destroying actively growing plants as a result of the rapid development of stem-girdling lesions, while the latter makes slow progress, occasionally causing slight precocity and limited discoloration of the pith, and may be recognized by linear rows of pycnidia on mature, dead, or dying stems, petioles, and pods. A technical diagnosis is given of *D. p.* var. *caulivora*, which differs from *D. p.* var. *sojae* in the absence of a conidial state, the production of perithecia in caespitose groups instead of singly, shorter and more tapering perithecial beaks, and smaller asci and ascospores. The immersed, globose perithecia measure 165 to 340 by 282 to 412 μ and their beaks 240 to 518 by 58 to 192 μ; the elongate to clavate, sessile, eight-spored asci 29·8 to 40·2 by 4·5 to 7 μ; and the hyaline, elongate to ellipsoid, uniseptate ascospores 8·6 to 11·8 by 3 to 3·9 μ.

Boswell (V. R.), Doolittle (S. P.), & Pultz (L. M.). **Pepper production, disease and insect control.**—*Fmrs' Bull. U.S. Dep. Agric.* 2051, 30 pp., 14 figs., 1952.

This bulletin, superseding leaflet 140 [*R.A.M.*, 23, p. 373], contains a section (pp. 15–28) on the more common diseases of chilli pepper and their control. Much of the information has already been noticed in this *Review*. Seedling damping-off, caused chiefly by *Rhizoctonia* [*Corticium*] *solani*, and *Pythium* spp. [cf. 30, p. 89], is reduced by seed treatment with arasan [loc. cit.], thiram 50, and phygon, and by soil disinfection with 40 per cent. formaldehyde diluted to 1 in 30. *Peronospora tabacina* [27, p. 587], occasionally serious in the south-eastern States, is controlled by spraying the seed-beds with ferbam or zineb. Against *Cercospora capsici* [28, p. 616] preparations containing zineb or nabam (with zinc sulphate) are used effectively in the field; seed treatment with mercuric chloride is also carried out. Southern blight (*Sclerotium rolfsii*) [23, p. 374] is common and destructive in the south-eastern and Gulf States. Also occurring in the Gulf States and in the south-west is *Phytophthora capsici* [33, p. 72], best treated by zineb or nabam sprays, good rotation, and seed disinfection. *Fusarium annuum* [25, p. 151] is most common in the south-western States, particularly on heavy, poorly-drained soils at about 80° F. Anthracnose (*Gloeosporium piperatum*) [*Glomerella cingulata*: 30, p. 444], affecting either green or ripe fruit, and ripe rot (*Vermicularia* [*Colletotrichum*] *capsici*) [cf. 32, p. 177], most serious on pimento peppers, are controlled by seed disinfection and zineb, nabam, or ziram sprays.

Zachos (D. G.). **Un cas de parasitisme des graines du Pois-chiche (Cicer arietinum L.) par le Stemphylium botryosum Wallr.** [A case of parasitism of Chick Pea (*Cicer arietinum* L.) seeds by *Stemphylium botryosum* Wallr.]—*Ann. Inst. phytopath. Benaki*, 6, 2, pp. 60–61, 1 pl., 1952.

In a lot of chick pea (*Cicer arietinum*) seeds received from the Plant Improvement Station, Messara, Crete, 27 per cent. were found to be attacked and prevented

from germinating by *Pleospora herbarum* [*R.A.M.*, 25, p. 579]. Of the obviously diseased seeds 56 per cent. yielded this fungus and only 44 per cent. *Ascochyta rabiei* [32, p. 259].

Richards (M.). **Control of Fusarium wilt in Cucumbers under glass.**—*N.Z.J. Agric.*, 88, 6, p. 548, 2 figs., 1954.

Cucumber plants, cleft-grafted at the stage when the first true leaves appeared on to the rootstock of the resistant *Cucurbita ficifolia*, obtained from the University of Wageningen, Holland [cf. *R.A.M.*, 33, p. 335], and grown from seed in the greenhouse at Massey Agricultural College, Palmerston North, New Zealand, when planted out in a commercial glasshouse on 14th October were free from *Fusarium* wilt (*F. oxysporum*) [32, p. 36] on 1st November, 1953, while all the ungrafted plants surrounding them were severely infected and died.

Storey (I. F.). **Mummy disease of Mushrooms.**—*Plant Path.*, 3, 2, p. 49, 1 pl., 1954.

In June, 1950, all the mushrooms growing in a large bed on the concrete floor of a house at a mushroom farm near Lancaster developed 'mummy' disease [*R.A.M.*, 28, p. 269], though another bed, less than two feet away, was unaffected. On 7th June compost and casing soil over an area of 4 sq. in. was removed from each end of two growing-trays (obtained from another grower) which had just started to produce mushrooms and replaced by material from the affected beds. By 28th June mushrooms with characteristic symptoms were being produced in all parts of the trays and for six weeks they continued to produce numerous small buttons. Material sent to Rothamsted Experimental Station and there treated similarly gave rise to typically affected mushrooms. No evidence was obtained that the disease was due to a virus: it is probably caused by some agent present in the soil and not perpetuated with the mushroom mycelium.

When the original beds were made into eight smaller ones, spread was restricted and only two beds became affected.

Cox (J. A.). **How growth and yield of Concord Grapes are affected by DDT—Bordeaux mixture.**—*Agric. Chemic.*, 8, 3, pp. 37–39, 151, 153, 155, 3 figs., 2 graphs, 1953.

Experiments during 1951 and 1952 in a commercial vineyard at North East, Pennsylvania, demonstrated that sprays of Bordeaux mixture alone or with DDT, applied with a hydraulic sprayer at 200 to 225 gals. per acre and 450 to 500 lb. per sq. in., retarded the vegetative growth and reduced yields (size of berries and clusters and number of clusters) of Concord grapes. In 1952 those sprayed with DDT and Bordeaux yielded 1·6 tons less fruit per acre than those receiving DDT plus ferbam [cf. *R.A.M.*, 31, p. 275; 32, p. 362]. Bordeaux injured vine foliage particularly in early season applications.

Bernon (G.). **Rôle des avertissements dans la lutte contre les maladies de la Vigne.** [Rôle of warnings in the control of Vine diseases.]—*Progr. agric. vitic.*, 139, 1–2, pp. 8–16, 1 pl., 2 graphs, 1953.

After a brief reference to the origin of the spray warning service against vine mildew [*Plasmopara viticola*] in France [*R.A.M.*, 3, p. 468; 29, p. 157, *et passim*] the author emphasizes the importance of accumulations of dead infected leaves as foci of infection in spring and also advises growers to drain their vineyards thoroughly before the first warnings are received.

An important warning is issued by the Montpellier Viticultural Station when the oospores are about to germinate. This enables a grower to find the primary infections in about ten days. Some growers, however, merely use the information to calculate the date of application of the first spray.

At the second warning, reporting the presence of the first, localized infections, growers are advised, whatever the weather conditions, to search for and destroy such lesions; shoots near soil-level should be removed and the branches surrounding the affected part sprayed.

Another type of warning is concerned with adapting the frequency of spray applications to the growth rate of the vines, so that the branch tips are not left too long without treatment. The interval between two applications, expressed in cm. length, depends on the vigour of the host, the number of attacks already experienced, and the local rainfall. It was because some growers paid no attention to this warning in 1951 that rain on 14th July caused them to lose their crop.

VIDAL (J.-P.). **Lutte contre l'altise et réflexions sur la lutte contre le mildiou en 1952 (suite).** [Control of the Flea-beetle and reflections on the control of mildew in 1952 (continuation).]—*Progr. agric. vitic.*, 140, 32–33, pp. 96–102, 1953.

Observations in Moroccan vineyards in 1952 showed that the best control of mildew [*Plasmopara viticola*: *R.A.M.*, 17, p. 217; cf. 33, p. 701, and preceding abstract] was given by copper acetate, closely followed by dithane [Z-]78 and 2 per cent. Bordeaux. The efficacy of the first two may have been due largely to the frequency of the applications.

Vine varieties only slightly affected included Alphonse Lavallée, Merseguera, Clairette égreneuse, Malvasia fina, Valensi noir, Muscat de l'Adda, Muscat du Zerhoun, Grand Noir, Ugni blanc, Cabernet français, Pinot blanc, Semillon, Mauzac, Black Monukka, Mont d'Or, Ignea, Perlona, and Sultanine musquée. The hybrids Seibel 5·860, 6·648, 14·596, 14·665, and 15·062 and Seyve-Villard 23–18, 10–300, 12–309, 12–327, 12–375, 12–395, 18–315, 19–233, and 23–501 were unaffected.

HENNER (J.). **Ein Rückblick auf die Rotbrenner-Bekämpfung 1953.** [A retrospect of 'rotbrenner' control in 1953.]—*Pflanzenarzt*, 7, 5, pp. 5–7, 1954.

Experiments were carried out in 1953 in the Retz district of Austria to determine the relative efficiency of a number of fungicides in the control of the locally important rotbrenner [*Pseudopeziza tracheiphila*: cf. 34, p. 129] on the susceptible Blue Portuguese vine variety, the treatments being applied on 8th and 20th May and 5th June. The best results were obtained with 0·5 per cent. captan, which conferred complete protection on 18 out of 147 stocks, followed by the same at 0·3 per cent. and Bordeaux mixture at 1 per cent. plus 0·3 per cent. colloidal cosan wettable sulphur, both with 14, compared with one unaffected stock in the untreated plots. The corresponding percentages of leaf infection were 15, 17, 20, and 33.

COOMBE (B. G.). **Control of black spot of Sultanas. Report of 1953–54 trial.**—*J. Dep. Agric. S. Aust.*, 58, 1, pp. 29–31, 1 fig., 1954.

In a trial at Berri, South Australia, to compare various spraying schedules for the control of anthracnose (*Elsinoe ampelina*) on sultana vines [see preceding abstract], the three schedules which included two sprays of 1½ lb. thiram or ziram per 100 gals. at bud swell and bud burst gave fewer spotty leaves than any of the single treatments. Thiram and ziram were equally effective; white oil appears to be superfluous as a sticker for thiram. As a result of this trial the control recommendations differ somewhat from those given previously [*R.A.M.*, 33, p. 11]. Two cover sprays (bud swell and bud burst) with ziram or thiram (1½ lb. per 100 gals.) are recommended where infection is severe and the one at bud swell only (3 to 4 lb.) where infection is mild. Follow-up foliage sprays are seldom required, but incidental spot development is easily checked by ziram, thiram, or Bordeaux mixture.

CONTENTS

AUTHORS' NAMES

kal, 86, 104
llington, 110
nderson, 76
ndrew, 95
postolides, 108
rx, 108
sada, 104
thow, 126
tkins, 90
vent, 97
yers, 75
alakrishnan, 104
aldacci, 99
ange, 72
arrau, 100
artels, 109
asse, 72
attie, 113.
ellingham, 89
enda, 111
ernon, 127
hattacharyya, 93
iraghi, 113
lackwell, 100
loom, 111
ose, 93
oswell, 126
oyce, 118
remer, 68, 71
rinkerhoff, 93, 123
roadbent, 68
ldwell, 126
mp, 91
ñamas, 88
rdona Alvarez, 71
stano, 102
namp, 95
narles, 97
nattopadhyay, 105
nevaugeon, 106
ok, 102
onabe, 128
rdner, 103
urtice, 107
x (J. A.), 127
x (R. S.), 124
erwińska, 100
vis, 70
y, 111
e Jong, 66
métriadès, 101
uel, 112
e Urries, 88
Caro, 113
ller, 113
Dirks, 101
Doolittle, 126
Drachovská-Šimanová, 121
Drechsler, 93
DuCharme, 91
English, 101
Evans, 73
Fellows, 89
Fergus (C. L.), 114
Fergus (I. F.), 72
Fink, 123
Fisher, 123
Fogliani, 98
Folsom, 102
Forti, 101
Francke-Grosmann, 114
Fransen, 70
Friend, 100
Fulton, 112
Gallegly, 111
Ganguly, 104
Garrett, 75
Gäumann, 112
Geraldson, 73
Ghanem, 86
Giacometti, 92
Glaser, 113
Grimaldi, 86
Goodban, 84
Goode, 115
Goodman, 120
Gorlenko, 80
Govi, 97, 113
Gupta (C. D.), 105
Gupta (V. C.), 122
Haasis, 84
Hall, 73
Hashioka, 105
Heiling, 70
Hemingway, 74
Henke, 121
Henner, 128
Higuchi, 118, 119
Hofer, 71
Hoffman, 106
Houtzagers, 113
Hubbell, 99
Hughes, 107
Iljin, 95
Imazeki, 108
Jagielski, 119
Johnson, 109
Jones, 72
Joubert, 72
Kajiura, 69
Kandiah, 105
Kaufman, 102
Keller, 102
Kendrick, 73
Kent, 92
Kirby, 97
Kitamura, 118
Klem, 119
Knorr, 91
Knott, 73
Koch, 121
Kohler, 132
Kondo, 105
Kono, 124
Kortsen, 123
Kouyeas, 115
Kovács, 69
Kowalik, 100
Kozłowska, 100
Laird, 110
Lambert, 75
Lamberts, 94
Langdon, 85
Le Conte, 90
Leyendecker, 73
Linn, 69
Loos, 67, 68
Lowe, 89
Luttrell, 91
Macgillivray, 124
Mackay, 100
Maclinn, 99
Majid, 81
Malaguti, 98
Malmus, 70
Mann, 124.
Mason, 97
Massenot, 65
Mastenbroek, 102
McDonald, 91
McEvoy, 109
Meckstroth, 92
Merek, 114
Middleton, 73
Milligan, 95
Molnar, 117
Morimoto, 120
Morwood, 125
Mouton, 93
Müller (E.), 108
Müller (K. O.), 100
Murphy, 90
Naef-Roth, 112
Nariani, 109
Naude, 91
Naylor, 111
Neenan, 120
Neuburg, 124
Norton, 125
Nyland, 97
Ogilvie, 68
Oishi, 86
Olson, 91
Orian, 107
Oswalt, 93
Padhi, 124
Padmanabhan, 104
Palti, 120
Papaioannou, 98
Parmelee, 94
Parris, 115
Pathanian, 109
Patton, 117
Peace, 113
Pierson, 76
Plotho, 69
Pontis Videla, 98
Portsmouth, 67
Pultz, 126
Ramsey, 97
Redmond, 115
Renaud, 87, 88
Rennerfelt, 117
Richards, 127
Riker, 117
Roach, 102
Roane, 90
Robinson, 115
Rodrigo, 105
Rogers, 65
Sadurska, 100
Sarazin, 76
Sarejanni, 98
Savile, 65
Scaramuzzi, 94
Scheffer, 111
Schmid, 116
Schmidt, 94
Schmitt, 108
Schneider, 65
Schroeder, 70
Sergeeva, 97
Siegel, 110
Sill, 89
Simons (J. N.), 122
Simons (M. D.), 90
Singh, 122
Smith (L. C.), 96
Smith (M. A.), 97
Smith (N. M.), 107
Snyder, 125
Sorgel, 122
Steindl, 107
Stephen, 110
Stoller, 75
Storey (I. F.), 127
Storey (W. B.), 92
Stout, 84
Soenen, 95, 99
Summers, 94
Sundaram, 106
Swenson, 70
Swift, 123
Takahashi, 120
Takeshita, 69
Thomas, 123
Toki, 108
Tolba, 86
Tomlinson, 93
Trentin, 89
Ueyama, 104
Unger, 122
Valleau, 109
Van Halsema, 101
Vaughan, 73
Verma, 99
Vidal, 128
Voigt, 118
Volcani, 112
Wahl, 112
Wakeley, 113
Walker, 111
Walters, 120
Waterhouse, 100
Webster, 67
Wedding, 73
Wellman, 87
Wenzl, 69
White (I. G.), 114
White (N. H.), 89
Wiant, 102
Wildman, 110
Wilkins, 80
Wilkinson, 76
Winston, 92
Wilhelm, 97
Wright, 97
Yadav, 65
Yale, 73
Yamaguchi, 124
Zachos, 109, 122, 126
Zaleski, 113
Ziller, 116

SUBJECT INDEX

tinomycetes, 100
ntibiotics, 97, 99, 100
cteria, 86, 97, 112
seases and disorders of:
Apple, 95–97
Cacao, 86–88
Cereals, 88–91
Citrus, 91–92
Cotton, 93
Fibre plants, 93–94
Flowers and ornamentals, 94
Fruit, 95–99
Groundnut, 73–75, 125
Herbage crops, 95
Insects, 128
Mushrooms, 75–76, 127
Palms, 92
Potato, 101–4
Rice, 104–5
Spices, 106
Sugar beet, 69–70, 121
Sugar-cane, 107
Tea, 66–68
Textiles, 93
Tobacco, 109–11
Trees and timber, 112–20
Vegetables, 68–77, 120–7
Vine, 127–8
Fungicides, 96, 99–100, 124
Genetics, 90
Lists of fungi or diseases, 109
Physiology, 86, 100–1, 109
Reports from Argentina, 84; British Honduras, 84; Bulgaria, 80; California, 84; Dominica, 84; E. Africa, 83; France, 80; India, 66, 81; Plant Protection Conference, Germany, 77; Uganda, 82; Wisconsin, 85
Soils and fertilizers, 72, 95, 105, 109, 120
Systematic mycology, 65, 100, 105, 107
Virus diseases, 68, 69, 70, 71, 73, 89, 91, 92, 97, 101, 109, 110–11, 121, 122–3

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